TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY

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# DATA-DRIVEN BUSINESS INTEGRATION IN THE PROCUREMENT CATEGORY MANAGEMENT OF AN ICT COMPANY

Master of Science thesis

Examiner: Prof. Jussi Heikkilä and Senior Research Fellow Aki Jääskeläinen
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# ABSTRACT

**JUHO HIRN**: Data-driven business integration in the procurement category management of an ICT company
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Procurement's role has become more strategic due to increasing significance of suppliers and intensified competition. Procurement has also been recognized to have a positive effect on the profitability of a company. Category management is one outcome of this change. Category management divides the supply expenditure of a company into categories and manages them through category strategies formed in collaboration with business units which requires integration. In the former research literature, data utilization in procurement focuses mainly on suppliers, supply expenditure and purchasing performance. There is a lack of research on category management and data-driven integration between procurement and business units.

This exploratory thesis focuses on three research questions. First, category management in the context of the case company is defined. The second research question focuses on the data-driven business integration in procurement. In addition, the effect of category management on this integration is studied. Finally, possibilities for improving data-driven business integration in procurement are studied. These three themes can be considered vital for the success of category management in the case company.

This thesis is a mixed-method single case study using an abductive approach for analyzing the results. The thesis consists of two empirical parts: interviews and a statistical analysis. The literature review provides background for category management and data-driven business integration. It also supports formulation of the hypotheses for the statistical analysis. Interviews provide an overview on the category management of the case company. The statistical analysis attempts to integrate data from business units and procurement into an analysis to test whether data-driven integration can provide insightful information for managerial decision-making. The aim is also to increase synergy between procurement and business units.

As a practical contribution, this thesis provides a framework of category management in the case company context. The findings give support for current research on the procurement's changing role. The results also provide insight into the data-driven integration in the case company at the moment of the study and possibilities for improving it. In addition, the statistical analysis provides interesting results on the integration of data between procurement and business units. The study shows that data-driven integration between procurement and business units can provide relevant information for the strategic decision-making in both procurement and business unit.

# TIIVISTELMÄ

**JUHO HIRN**: Dataan perustuva liiketoimintaintegraatio ICT-yrityksen hankinnan kategoriajohtamisessa
Tampereen teknillinen yliopisto
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Hankinnan rooli on muuttunut strategisemmaksi johtuen toimittajien kasvaneesta merkityksestä ja kiihtyneestä kilpailusta. Lisäksi hankinnalla on tunnistettu olevan positiivinen vaikutus yrityksen kannattavuuteen. Hankinnan kategoriajohtaminen on eräs kyseisen muutoksen aiheuttama lopputulema. Kategoriajohtamisessa yrityksen hankintamenot jaetaan kategorioihin, joita johdetaan kategoriastrategioilla. Kategoriastrategiat on muodostettu yhteistyössä liiketoimintayksiköiden kanssa, mikä vaatii integraatiota. Aiemmassa tutkimuskirjallisuudessa hankinnan datankäyttö on kohdistunut pääasiassa toimittajiin, hankintamenoihin ja hankinnan suorituskyvyn mittaamiseen. Kategoriajohtaminen ja dataan perustuva integraatio liiketoiminnan ja hankinnan välillä ovat tutkimusaukkoja nykyisessä kirjallisuudessa.

Tämä tutkimus keskittyy kolmeen tutkimuskysymykseen. Ensin, kategoriajohtaminen määritellään tutkittavan yrityksen kontekstissa. Seuraava tutkimuskysymys keskittyy dataan perustuvaan liiketoimintaintegraatioon hankinnassa. Lisäksi tutkitaan kategoriajohtamisen vaikutusta tähän integraatioon. Lopuksi tutkimus keskittyy dataan perustuvan liiketoimintaintegraation kehittämismahdollisuuksiin. Näitä kolmea teemaa voidaan pitää keskeisinä onnistuneelle kategoriajohtamiselle kohdeyrityksessä.

Tutkimus hyödyntää abduktiivista lähestymistapaa tulosten analysointiin ja se yhdistelee useampaa tutkimusmenetelmää yksittäisen tapauksen tutkimiseen. Empiirinen osuus koostuu haastatteluista ja tilastollisesta analyysista. Kirjallisuuskatsaus luo pohjaa kategoriajohtamisen ja dataan perustuvan liiketoimintaintegraation tutkimiselle. Se myös tukee tilastollista analyysia varten muodostettuja hypoteeseja. Haastattelut kartoittavat kohdeyrityksen kategoriajohtamisen tilaa. Tilastollinen analyysi integroi dataa liiketoiminnasta ja hankinnasta tutkiakseen, miten dataan perustuva integraatio voi tarjota hyödyllistä informaatiota liikkeenjohdolliseen päätöksentekoon. Tarkoituksena on myös lisätä synergiaa hankinnan ja liiketoiminnan välillä.

Diplomityö tarjoaa tuloksena kategoriajohtamisen viitekehyksen käytäntöön kohdeyrityksen toimintaympäristössä. Työ tukee tämänhetkistä tutkimuskirjallisuutta hankinnan muuttuvasta roolista. Tulokset tarjoavat havaintoja dataan perustuvasta liiketoimintaintegraatiosta ja sen kehittämisestä kohdeyrityksessä. Tilastollisen analyysin tulokset ovat mielenkiintoisia dataan perustuvan integraation kannalta. Diplomityö tuottaa rohkaisevia tuloksia dataan perustuvan integraation tuottamista hyödyistä strategiseen päätöksentekoon sekä hankinnassa että liiketoimintayksikössä.

# PREFACE

The university life has been a long journey for myself with many lovely memories and moments. First, I would like to thank all the people I have met during my studies. I have made many new friends who I hope to stay in contact with during the years to come. Now, my studies are coming to an end and this thesis depicts the culmination of the past 7 years. Many people have assisted me on my way to finish it. I would like to thank professor Jussi Heikkilä and senior research fellow Aki Jääskeläinen for the opportunity to work on an interesting topic and for the guidance during this project. Without the fruitful conversations, this thesis could have gone to a completely different direction. I would also like to thank representatives of the case company (Tomi, Juha and Ilari especially) for their contributions during the data collection and for our discussions during this project.

I have enjoyed working at the university a lot. The atmosphere at the university is amazing due to numerous colleagues and co-workers. It has been a nice experience thanks to all of you (I will not list all the names but you know who you are). I would also like to thank the 3Fs, friends, fools, and family for their support and understanding. Mom and dad, I finally did it. You don't have to stress anymore. Last but not least, I would like to thank my amazing girlfriend, Taru, for her help and understanding. You will have to read this though, just for fun. Finally, this quote from a childhood idol of mine reflects working on this thesis and my values in general well so I'll finish with it:

*"You can't be paralyzed by the fear of failure or you will never push yourself. You keep on pushing because you believe in yourself and in your vision and you know that it is the right thing to do, and success will come. So don't be afraid to fail."*

*-Arnold Schwarzenegger*

Tampere, 4.7.2016

Juho Hirn

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# 1. INTRODUCTION

## 1.1 Background and motivation

Before, procurement was considered a separate support function. Nowadays, there is a clear trend towards procurement with strategic significance and cross-functional collaboration due to increased outsourcing caused by intensifying competition. Increased outsourcing increases the strategic significance of procurement. Therefore, modern, strategic procurement has a positive effect on the profitability of a company (Reinecke et al. 2007). Trent & Monczka (1998) emphasize capturing corporate synergies through flexible procurement organizations allowing cross-functional and cross-business unit collaboration and communication. Brown & Cousins (2004) and Seth (1996) consider procurement function's alignment with other functions critical arguing that a separate procurement organization is no longer appropriate. In addition, the strategic status of procurement has increased in business organizations during the past 20 years (Gadde & Hakansson 1994; Carter & Narasimhan 1996). Driedonks et al. (2010) consider procurement a key area for improving competitive advantage. This is the outcome of modern organization's cost structure of which up to 80 per cent can be sourced goods and services (van Weele 2010, p.13; Iloranta & Pajunen-Muhonen 2015, p.21).

Recent trends in managing procurement and its business integration, such as purchasing category management, focus on core competences, sourcing of entities, and intensifying competition have also assisted the rise of strategic procurement. Some procured entities require more attention than others sourced with a traditional, operative logic of purchasing. First implications for this were presented in purchasing portfolio model by Kraljic (1983). The sourcing categories requiring a strategic focus are often an important part of the firm's offering and competitiveness. Therefore, their acquisition requires input from business units as well as procurement organization. For this kind of procurement to be successful, there needs to be integration and collaboration between different business units of the company and procurement organization. The information needs for the decision-making of strategic and operational procurement functions are completely different. Strategic procurement operates in close co-operation with the business units (Reinecke et al. 2007). Therefore, strategic decision-making in procurement requires more data on the external environment of the company instead of focusing only on procurement spend (Marakas 2003). Strategic procurement also demands different integration mechanisms with business units. According to Reinecke et al. (2007), talented procurement organizations have close co-operation with business units and integration between procurement and business units is designed together to support this co-operation. Already in 1988,

Reck & Long (1988) argued that strategic procurement should be integrative. For example, Narasimhan & Das (2001) consider procurement integration important for manufacturing performance. Still, Pagell (2004) considers there is not enough research on how companies can achieve this integration.

This thesis focuses on studying the integration between business units and procurement from the perspectives of category management and data. Integration is studied from the perspective of data by combining data sources from both business and procurement in an attempt to provide relevant information for managerial decision-making in procurement. In global sourcing organization and purchasing category management literature, many academics consider themselves lagging behind the practitioners (Quintens et al. 2005; Heikkilä & Kaipia 2009; van Weele 2010, p. xxi). According to O'Brien (2009, p. 5) the term "category management" appeared in purchasing in the late 1980s. There is no universal definition for category management in academic literature even though it has been present in the procurement landscape for some time. Literature on the integration from the perspectives of data and category management is also scarce since most authors focus on the benefits of integration instead of the manners in which integration is achieved (Frolich & Westbrook 2001; Pagell 2004).

In past literature, there is no research on data-driven integration between procurement and business units, although, some areas of procurement-related data have been studied extensively (Ho et al. 2010). Studied research areas include supplier and purchasing performance measurement. Supplier evaluation has been studied extensively but Ho et al (2010) consider the currently used criteria to not take into consideration the impact of business objectives and the needs of company stakeholders which implies lack of integration. Pohl & Förstl (2011) also consider it important for purchasing performance measurement systems to be linked into business objectives and non-financial performance measures in order to increase strategic integration in procurement. In this master's thesis a practical definition of category management in the case company's context is attempted to be reached for the purpose of exploring the decision-making and data-driven business integration in category management. There are many terms for category management, such as category sourcing and commodity management, but the term "category management" is used in this thesis.

## 1.2 Context and structure of the thesis

This thesis is part of Smart Procurement-programme of Tekes Finnish Funding Agency for Innovation. Smart Procurement-programme aims to speed up the introduction of innovations through procurement excellence and market development (Tekes 2016). Under the programme, this thesis is part of ProcuValue research project (Value from procurement) which aims to study the long-term value of procurement. The objective of the research project is to develop novel expertise in the field of long-term procurement which will benefit both the purchasing organizations and suppliers. Research project consists of

a qualitative multiple case study with four case companies, one of which is the case company of this thesis.

The case company of this thesis is in the ICT industry. It has a global purchasing organization but main business area is Northern Europe. The case company has adapted category management about five years ago with the aim of improving synergy and integration with business units. This has increased the strategic status of procurement, and procurement personnel consider the integration with business to have improved in the recent years. Procurement organization has been benchmarked to industry standards, and top management alongside external consults considered procurement very capable and competitive. Nevertheless, procurement organization thinks of the utilization of data in decision-making their pitfall.

This thesis is divided into two empirical parts: interviews and statistical analysis. The research process also includes group discussions with the case company's representatives to discuss the results and their implications from both empirical parts. The research process is presented in *Figure 1*. Preliminary group discussion was conducted first to specify the subject of this thesis. This group discussion consisted of the research group and the contact personnel from the case company. This was followed by the interview study to study the phenomenon chosen in preliminary group discussion. Results of the interview study were reviewed in the first group discussion. Based on the results of interviews and first group discussion, a statistical analysis was carried. The results of the statistical analysis and their implications were discussed in a second group discussion.


***Figure 1.*** *Research process of this thesis*

In the second chapter of this thesis, literature review on category management is presented. *Chapter 2* includes subjects, such as, category management in practice and its premises, integration mechanisms, role of procurement, and procurement strategy hierarchy. Literature on category management is scarce but some definitions offer foundation for this study. Portfolio approaches and purchasing synergies can be considered to be the premises of category management. Category management involves collaboration between business units and procurement so integration mechanisms and role of procurement are an important part of category management. The chapter finishes with relevant levels of procurement strategy hierarchy for category management and category management in practice. In the third chapter, data is the main focus. *Chapter 3* begins with the importance of information in procurement, following with information processing. *Chapter 3* concludes by taking the information theme to the perspective of procurement, travelling and personal contact. Methodology of the study is presented in the fourth chapter. This includes both the interviews and statistical analysis. Results on the empirical parts are presented in the fifth chapter. The thesis concludes with the discussion of findings in the

sixth chapter and conclusions in the seventh chapter. Implications for management and further research are presented in the conclusions.

## 1.3 Research objective and questions

The main objective of this study is to analyze the data-driven integration between business units and procurement in category management of the case company. Integration is studied from the perspectives of procurement's role and data integration with business units. The thesis consists of two parts: interviews and statistical analysis. The main research questions of this thesis are:

1. *What is category management in the context of the case company?*
2. *What kind of data integration exists currently between procurement and business? How category management affects the integration between procurement and business unit in a successful case?*
3. *How can data-driven integration between procurement and business units be improved?*

In the interviews, the current state of business integration in the category management and possibilities for improving data integration with business units in the procurement activities of the case company are studied. Interview study will focus on all three research questions of this thesis. The main focus is on data and decision-making in the category management. A successful sales case, which is considered to represent desired practices of category management, is selected to be studied more in-depth to offer comparison between the general state in the company and a case of successful category management practices.

In the statistical analysis, an opportunity for improving data integration between procurement and business units is studied. Statistical analysis focuses on the third research question. Correlation calculations combine data from both the business units and procurement. The main focus is to represent benefits data integration could offer, for example, through statistical analysis. They are formed to study the relationships between travelling, sales opportunities and customer satisfaction. Relationships between travelling, sales opportunities, and customer satisfaction could offer interesting information for managerial decision-making. Calculations are based on data from customer satisfaction surveys, travelling expenses and sales forecast tool. The chosen data represents data sources from both business and procurement and therefore, it is an innovative attempt to find relevant information through data integration between procurement and business. Results could offer possibilities for better budget calculations and relevant input for managerial decision-making in both business and procurement. If correlation was found, it would indicate value provided by a procured cost component. In this case the chosen cost component is travelling cost, and its value components are considered to be increased customer satisfaction and increased sales or sales opportunities.

The wider objective of this study is to increase the synergy and integration between procurement and business. Case company's procurement organization has clearly emphasized the need to be close to the business of their company. The purpose is to clarify and improve category management through data integration with business units, the data used and decisions made based on that data. Results of this thesis can offer insight into the effect category management has had on the integration between procurement and business units.

## 1.4 Research approach

This study focuses on the data-driven integration in procurement category management. The study follows the principles of applied research. According to Saunders et al. (2009, p. 8-9) applied research attempts to understand company-specific problems which managers value as important. Applied research is often seen very similar to consultancy but there are essential differences. Westbrook (1995) considers a consultant to share a common goal with the company while a researcher will also have a goal of finding new knowledge. Westbrook (1995) also argues that for a consultant, the end result is more important than the process and means to achieve it which can provide important information for a researcher. The methodology and research choices of the thesis are illustrated in *Figure 2* based on the research onion model of Saunders et al. (2009, p. 138).

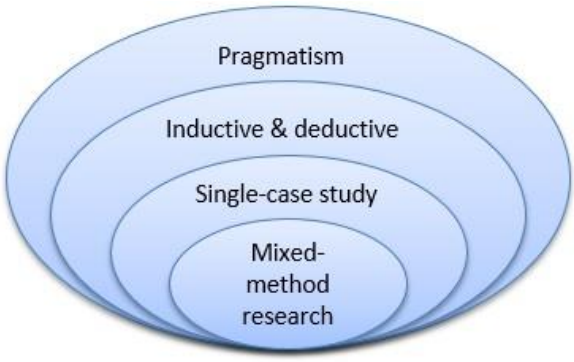


***Figure 2.*** *Methodology and research design of the thesis (adapted from Saunders et al. 2009, p. 138)*

This study has a pragmatist view since both qualitative and quantitative methods are used to examine a complex phenomenon of integration in category management (Saunders et al. 2009, p. 109). There are similarities to interpretivist perspective since interviewer interprets the data from interviews, which is common in business research (Saunders et al. 2009, p. 116). Both inductive and deductive approaches are used since literature is scarce and no theory can be formed based on it alone (De Vaus 2001, p.6). Interviews of the first phase are both inductive and exploratory. All observations were considered interesting for building theory on integration in category management of the case company. Correlation calculations in the second phase are deductive since they are used to test chosen hypotheses. This study is a single-case study which consists of interviews in the case

company, and multiple data sources from business units and procurement. To validate the data from the interviews, multiple persons of similar organizational background are interviewed (Saunders et al. 2009, p. 146). Also, results from both phases of this thesis were validated in two group discussions with the representatives of the case company. Group discussions were used to identify implications of the results in practice. Research design of this study is mixed-method research (Saunders et al. 2009, p. 152). Both qualitative and quantitative methods are used sequentially in data collection techniques and analysis procedures but they are not combined.

The first part of this study is a literature review which creates the basis for the study. Literature on category management is scarce and it is complemented with review on relevant global sourcing themes, such as role of procurement and procurement strategy hierarchy. The aim is to form a clear picture of the category management and related phenomena prior to the collection of the data as Saunders et al. (2009, p. 140) advices. The next part of literature review considers data in managerial decision-making and procurement.

The empirical part is a case study consisting of two phases. In global sourcing literature, there has been a need for more case studies (Trent 2004; Dubois & Araujo 2007). According to Dubois & Araujo (2007), case studies can benefit the development of research field in purchasing and supply management by acting as references for theory development or as instances of particular phenomena. In the first phase of this thesis, semi-structured interviews are used to interview persons involved in the category management of the case company. This includes personnel outside the procurement organization, for example persons from business units. Strict structures should not limit the interviews since the interviewees' opinions are considered important. In total, there will be eleven interviews which are chosen using purposive sampling to offer a broad view of category management in the case company. In the second phase, possibilities for proactive data utilization and integration in procurement and business are studied through correlation calculations between data on travelling expenses, sales and sales opportunities, and customer satisfaction. Statistical methods were used in the context of integrating data from business and procurement in the case company. It was considered important for the results to be useful for managerial decision-making in practice. Therefore, correlation calculations were considered appropriate for the second phase of this thesis.

## 1.5 Key concepts

### Procurement

According to van Weele (2014, p. 8), organizations use many terms for their buying function. Procurement, purchasing and sourcing are often used interchangeably. In literature, terms, such as, supply chain management and logistics often refer to procurement. In *Figure 3*, van Weele (2010, p. 8) has presented procurement and the related concepts

based on their tasks in the purchasing process. This model is widely used among academics. It shows the concepts in purchasing and their responsibilities in the purchasing process.

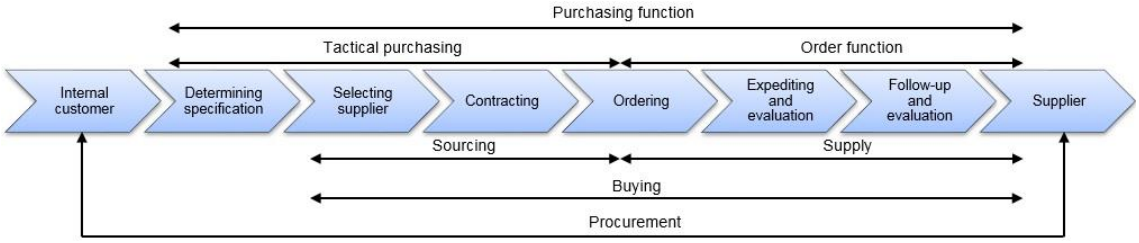


***Figure 3.*** *Procurement and related concepts (van Weele 2010, p. 8)*

*Figure 3* clearly shows the close relationships of different concepts in purchasing which have many overlapping tasks. The differences between some of the terms are minor. Procurement, buying and purchasing function have a lot in common. According to van Weele (2014, p. 10), procurement is based on total cost of ownership-thinking which implies that procurement is more interested into the long-term benefits of supplier relationships instead of focusing solely on cost and transactional relationships. Procurement is used in this thesis due to two reasons. First reason is the long-term focused total cost of ownership-thinking which supports a more strategic approach in purchasing. The other is the terminology used in the case company which favors using procurement.

## Procurement category management

This thesis forms a practical definition of category management in the context of the case company since all current definitions are generic and, therefore, quite vague. O'Brien (2009) defines category management as a strategic, process-based approach which focuses on the spend of an organization. Forming purchasing categories has been a common practice for a long time but recently companies have started to analyze all of their purchasing costs and forming categories covering the whole spend (Heikkilä & Kaipia 2009). For O'Brien (2009), category management is also a cross-functional commitment for an organization. In practice, it means segmenting the main areas of organizational spend into groups of products and services according to their function, i.e. categories, and to mirror their individual marketplaces. These category segments are then reviewed to challenge what has gone before and to create value for the organization. At the highest level, he has recognized two main categories: direct and indirect spend.

O'Brien's (2009) definition of category management focuses on the forming of categories which can be considered only the first step of category management. Some scholars see category management more widely. For example, Van Weele (2010, pp.207-214) uses the term category sourcing instead of category management. He sees category sourcing as a strategic tool for procurement. Every spend category and supplier base needs to follow different strategic choices. Van Weele (2010, p. 216) proposes category management

to consist of three stages: category planning, category sourcing and category implementation. The foundation of category management is a spend analysis which facilitates the categorization of spend into a category tree. The categories are segmented based upon cost savings potential and ease of implementation and most promising categories are chosen for the examination of potential improvements in purchasing specification, supplier selection and legal arrangements with the supplier. Trent & Monczka's (2003a; 2003b) global sourcing shares many similarities with category management, such as the integration and coordination of common items and materials across different purchasing locations.

## Data and information

One of the most cited scholarly article about data-information-knowledge-wisdom hierarchy is Ackoff's (1989) "From data to wisdom". Ackoff (1989) proposes the hierarchy to consist of data, information, knowledge, understanding, and wisdom. He considers a higher level of the hierarchy to include the lower levels. Data is defined as symbols representing properties of objects and events. When processed to increase its usefulness, data becomes information. Information represents properties of objects and events in a more compact and useful way than data. According to Ackoff (1989), the difference between data and information is functional instead of structural. Information answers questions who, what, when, where, and how many. Knowledge, on the other hand, answers the question of how-to while understanding answers the question of why. Information, knowledge, and understanding increase efficiency while wisdom increases effectiveness. Efficiency is measured relative to an objective. It measures how well resources are used to achieve an objective. Ackoff (1989) considers effectiveness to be evaluated efficiency, as in efficiency multiplied by value of the objectives. In other words, efficiency is "doing things right" while effectiveness is "doing the right things".

There are several definitions for data, information, knowledge, and intelligence, such as Davenport & Prusak (1998) and Thierauf (2001). These definitions share similarities with Ackoff's (1989) definitions. Data is typically the lowest level in the hierarchy with information and knowledge on top of it. Davenport & Prusak (1998) make an important remark about data: a receiver can understand the meaning of data if the data has a certain context. Thierauf (2001, p. 8) builds on this by defining information as data in a structured form. In other words, information has been given a meaning, making it more valuable than data, which supports Ackoff's views. An important view is also tacit and explicit knowledge. Data and information are closer to explicit knowledge while knowledge, understanding, and wisdom are closer to tacit knowledge as concepts. Data and information are objective and neutral to the receiver while knowledge, understanding, and wisdom include personal valuation. This thesis focuses on data and information since the higher levels of the hierarchies are highly subjective and more complicated for research purposes.

## Business integration

Integration is a widely used concept in literature. Still, Pagell (2004) argues that there is no single, accepted definition for it. Integration is studied in multiple different organizational phenomena, e.g. product development, marketing, and supply chain. Its definitions vary as much as its areas of application. Most definitions emphasize collaboration between organizational entities, e.g. Mintzberg et al. (1996), Kahn & Mentzer (1998), Krajewskis & Wei (2001), and Narasimhan & Das (2001). Some authors have studied integration from the perspective of data which is the focus of this thesis, although they have focused on the integration in the supply chain instead of business integration in procurement (Narasimhan & Kim 2001; Ganeshan 2002; Kelley 2002). Nevertheless, the studies in supply chain integration emphasize information systems as an integration mechanism. Integration is divided into external and internal integration (Pagell 2004). External integration occurs between organizations which is a common focus for studies in supply chain integration, such as, Krajewskis & Wei (2001). Internal integration occurs across various parts of an organization (Pagell 2004).

Kahn & Mentzer (1998, p. 56) state that integration is "formally defined as a process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization". Other definitions share a lot of similarities with this definition, for example, O'Leary-Kelly & Flores (2002) and Pagell (2004). Narasimhan & Das (2001, p. 596) have defined integration from the viewpoint of procurement: "Purchasing integration involves the active participation of purchasing in the strategic debate within the firm and is aimed at promoting the alignment of purchasing practices and goals with strategic business priorities". This definition shares the idea of category management that strategic decision-making in procurement should be done in collaboration with key business units. It does not conflict with the definition of Kahn & Mentzer (1998) so this thesis will base itself on these two definitions.

Based on the mentioned definitions, it is clear that collaboration forms the basis for integration. This thesis will utilize the widely approved definition of Kahn & Mentzer (1998). The definitions, though numerous, have a lot in common and the differences between them are very minor. Therefore, the definition of Kahn & Mentzer (1998) is suitable for the purposes of this thesis. Nevertheless, former literature offers scarce information on how integration is achieved (Pagell 2004). This thesis is a case study on how category management promotes data-driven business integration in procurement. Therefore, collaboration through data sharing is a central focus. Also, collaboration between procurement and business units is affected by the way procurement's role is perceived by business units which is a secondary focus of this thesis.

# 2. PROCUREMENT CATEGORY MANAGEMENT

## 2.1 Changing role of procurement

Category management aims to shift procurement's role from an operational function towards a strategic business partner. This shift in procurement's role has been present both in practice and in research literature. Mintzberg (1978) defined strategy as "a discernible pattern over time in a stream of corporate decisions". This definition would include any stream of decisions as a strategy. Carter & Narasimhan (1996) considered the main purpose of a strategy to be the development of sustainable competitive advantage. According to them, a corporate function is strategic when it contributes to competitive advantage and corporate performance over time. In their study, Carter & Narasimhan (1996) studied the strategic significance of procurement function. Procurement's role as a strategic, instead of a tactical function started to establish in 1980s. Pearson & Gritzmacher (1990) presented that the firm performance and purchasing strategy were linked. Companies followed this trend by shifting the role of their procurement from tactical to strategic (Freeman & Cavinato 1990). In the later stream of research, authors have recognized a shift from the traditional, administrative and transactional role towards strategic partnerships, cooperative alliances and supply network management (Carr & Smeltzer 1997; Lamming et al. 2000; Knudsen 2003). Paulraj et al. (2006) also considered procurement to have a major strategic importance. There are also conflicting views on the strategic position of procurement. Procurement is still considered to be a support function having a tactical role and performing low value adding activities (Kaufmann & Carter 2004; Cox et al. 2005).

Carter & Narasimhan (1996) considered the image and status of procurement to be affected by the contribution of procurement to both the overall corporate performance and the performance of other functions. They concluded their study in four findings. First, procurement has an impact on the overall performance of a company. Second, procurement plays a crucial part in the competitiveness of a company and it should be involved in the corporate strategy formulation and decision-making. Third, partnering with suppliers provides more benefits than traditional supplier relationships based on purchasing power and leverage. Finally, routine, operational procurement can be decentralized but centralized control is required over strategically oriented procurement activities.

Researchers have developed multiple models and typologies to identify developmental stages of the procurement function. Reck & Long (1988) presented four stages of development in procurement configurations: passive, independent, supportive, and integrative. Freeman & Cavinato (1990) identified the development of strategic purchasing to have five stages: buying, purchasing, procurement, supply acquisition, and facilitating networks. Cammish & Keough (1991) proposed four stages of development: serving the

factory, lowest unit cost, coordinated purchasing, and strategic procurement. Cousins et al. (2006) provided a taxonomy of purchasing configurations based on their levels of strategic planning, status, internal integration, and skills. The configurations are strategic purchasers, capable purchasers, undeveloped purchasers, and celebrity purchasers.

Strategic purchasers are highly regarded, tightly integrated with the business and involved in the strategic decision-making. Capable purchasers contribute to strategy but they are not as integrated internally or held in the same regard as strategic purchasers. Undeveloped purchasers are a professional function but react and respond to the needs of the business unit. Celebrity purchasers are considered an interesting group outside the current classification systems. Cousins et al. (2006) considered their model to be consistent with the typology of Reck & Long (1988). Strategic purchasers are parallel to the integrative stage in Reck & Long's (1988) typology. They reflect a mature and proactive procurement function. Strategic purchasers are involved in the strategic planning of the company. Strategic purchasers focus more on managing the supply chain than contracts. Capable purchasers reflect the supportive stage. They are professional and highly skilled but not proactive or dynamic as a procurement function. They have moderate levels of status, internal integration and involvement in strategic decision-making. Undeveloped purchasers are in the independent stage. They are of little concern to top management and have the lowest levels of status, strategic planning and internal integration. Nevertheless, undeveloped purchasers are highly skilled which offsets their other limitations. Celebrity purchasers possess a high level of status in the eyes of top management but the lowest levels of skills and knowledge compared to other configurations. They have low involvement in strategic planning and moderate level of integration. An example of celebrity purchaser configuration is a procurement function focusing on negotiations with suppliers and price savings. It may be considered valuable but it focuses on operational issues instead of strategic thinking. All typologies on procurement's role are illustrated in *Figure 4*. Strategic developmental stages are highlighted with a red color while operative stages are light blue.

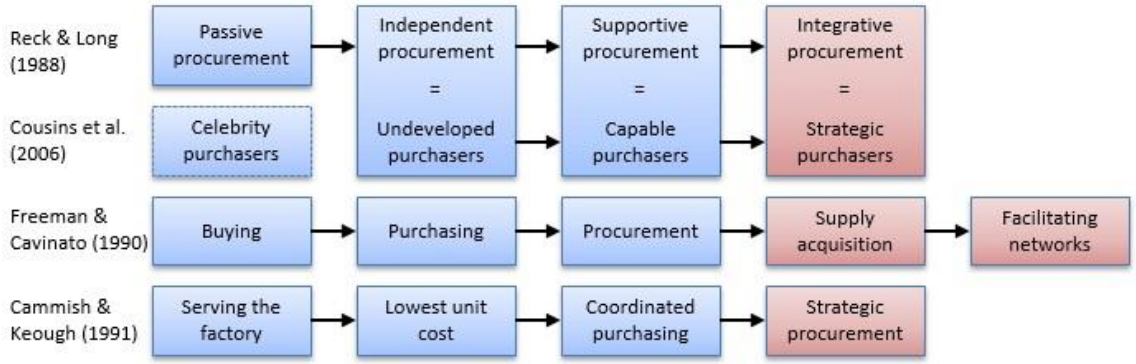


***Figure 4.*** *Typologies on procurement's role (adapted from Reck & Long 1988; Cousins et al. 2006; Freeman & Cavinato 1990; Cammish & Keough 1991)*

Tassabehji & Moorhouse (2008) have studied how procurement professionals perceive their role within their organizations and what skills procurement professionals believe are required to fulfill their role effectively. They built their study on Cousins et al.'s (2006) taxonomy of purchasing configurations (celebrity, strategic, undeveloped, and capable purchaser). Some interviewees in their study felt that the role of procurement was still very traditional as an administrative function. Others recognized procurement having a strategic, value adding role to the organization but they still considered the communication of value to their organization to be troublesome. Only in one instance of their 22 interviews the procurement function was represented at an executive board level. Procurement was rarely involved early in the deal process. Instead, they were often presented with a done deal with the responsibility of finishing the contract. Procurement professionals were dissatisfied with how their role was perceived and considered internal recognition of their role important for it to contribute to the organization's performance. Interviewees felt that their role was changing but very slowly and incrementally. Internal acknowledgment, early involvement in the decision process, internal support to procurement strategy, cultural barriers, and resistance to change were considered the main challenges and issues created by the changing role of procurement.

Based on the presented typologies, it is clear that the role of procurement is changing towards strategic. Nevertheless, it is important to notice that none of the authors imply that all procurement should aim to be strategic. The last stages of development typologies should not be considered as a roadmap or a target for procurement organizations. It is also important to notice that different typologies emphasize different qualities as important for strategic procurement. Both Reck & Long (1988) and Cousins et al. (2006) consider strategic procurement to be integrative while Freeman & Cavinato (1990) and Cammish & Keough (1991) emphasize managing supplier networks and partnerships. As a similar case study, Tassabehji & Moorhouse's (2008) study can provide interesting viewpoints for this thesis. The situation in their case companies are very similar to the case company of this thesis. Organizations in both studies have recently started to shift the role of procurement organization from administrative and operative function towards strategic.

## 2.2 Integration mechanisms in category management

Decision-making in category management involves both the procurement and business units which increases the importance of integration mechanisms (O'Brien 2009). Integration mechanisms, such as strategy review meetings and cross-unit teams with business units, can be considered basic building blocks for category management in procurement. Trautmann et al. (2009) divide integration mechanisms into vertical and lateral mechanisms. Vertical integration mechanisms consist of centralization, formalization, standardization, and vertical information systems. Lateral mechanisms consist of, for example, job rotation, cross-unit teams, and integrators.

Studies show that global procurement organizations use different integration mechanisms, such as harmonized IT infrastructures, strategy review meetings, cross-unit teams, and organizational structures (Trent & Monczka 2003a and 2003b; Rozemeijer 2000; Faes et al. 2000). In global procurement organization literature, centralization versus decentralization is a common topic of debate (Arnold 1999). Prior research considers three types of global sourcing organizations relevant: centralized, decentralized and hybrid (Fearon 1988; Narasimhan & Carter 1989; Arnold 1999). The design of a procurement organization depends on the level of corporate internationalization, purchasing maturity, and international purchasing strategy (Arnold 1999; Rozemeijer et al. 2003; Trent & Monczka 2003). Lateral integration mechanisms are often used to manage uncertainty posed by category characteristics (Trautmann et al. 2009). Larger companies can rely more on both vertical and lateral mechanisms (Trent 2004).

Trautmann et al. (2009) have studied the integration mechanisms in global sourcing organizations from an information processing perspective. Integration mechanisms can be considered vital for category management since category management involves cross-functional collaboration. They base their study on the information processing framework of Tushman & Nadler (1978). *Figure 5* shows the information processing framework by Tushman & Nadler (1978) with the adaptations to the procurement perspective by Trautmann et al. (2009). In Tushman & Nadler's (1978) information processing framework, there should be a fit between information processing requirements and information processing capacity in effective organizations. Information processing requirements depend on uncertainty. In other words, higher uncertainty induces higher information processing requirements, and therefore, higher information processing capacity.

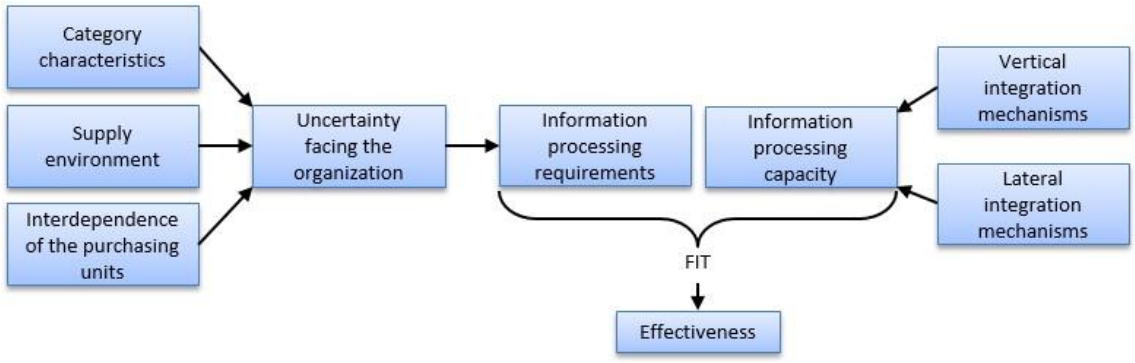


***Figure 5.*** *Information processing framework (adapted by Trautmann et al. 2009 from the original figure in Tushman & Nadler 1978)*

Tushman & Nadler (1978) consider uncertainty to arise from task characteristics, task environment, and inter-unit task interdependence. Trautmann et al. (2009) consider category characteristics (discussed in *Chapter 2.5*) to be similar to Tushman & Nadler's (1978) task characteristics. Task environment of Tushman & Nadler (1978) is replaced by supply environment in Trautmann et al. (2009), as inter-unit task interdependence is

replaced by interdependence of the purchasing units. Information processing requirements and capacity should have a fit in effective organizations which is supported by the fact that category characteristics have a significant effect on organization design and organizational designs vary across categories (Trautmann et al. 2009; Matthyssens & Faes 1997). Information processing capacity is affected by vertical and lateral integration mechanisms.

Integration mechanisms differ based on the purchasing synergy which is attempted to be achieved. Findings of the case studies on integration approaches in global sourcing organizations of Trautmann et al. (2009) are shown in *Appendix 1*. In economies of scale, decision-making is centralized to a category manager but the category manager is responsible for driving consolidation of requirements between different local sites. The purchasing process is standardized with clear roles and responsibilities to reduce misunderstandings between category manager and local managers. IT systems allow exchange and analysis of spend data and local contracts, suppliers, specifications and "maverick" spending. Strategies are formed through global category management teams including senior managers from key local sites and the category manager. The acceptance of strategies is ensured this way. Uncertainty is reduced via formal purchasing processes, global IT systems, cross-unit teams, and category managers as integrators. (Trautmann et al. 2009)

With economies of information and learning, uncertainty from category characteristics and supply environment is significant because they are characterized by new buy or modified rebuy situations and there is often a limited number of capable suppliers. Decision-making is centralized to a global category manager but the extent of centralization varies. Information systems provide transparency over contracts, suppliers, and prices. Category manager acts as a liaison between different purchasing locations and his involvement varies by case. Economies of process are the focus when unit cost is low and the goal is to minimize transaction costs. Companies use mainly vertical integration mechanisms. Decision-making is decentralized but purchasing processes are highly standardized to establish best-practice performance across the organization. Therefore, lateral integration mechanisms are not used which indicates low uncertainty. IT systems serve as a platform for making documents, templates, manuals, and best-practice descriptions. (Trautmann et al. 2009)

## 2.3 Premises for category management

Category management builds on two premises: portfolio approaches and purchasing synergies. These two offer the strategic background for decision-making in category management. First procurement-related portfolio approach was presented by Kraljic (1983). Kraljic's (1983) portfolio approach refers to analyzing and classifying (i.e. categorizing) purchased items and creating separate purchasing strategies for each group. Trent & Monczka (2003a; 2003b) argue that identifying common requirements across business units is necessary for global success. Van Weele (2005) supports this by presenting that

with greater commonality of the purchased products, more benefits can be obtained from a centralized or coordinated approach.

First in portfolio approach, products are analyzed and classified into four groups (strategic items, leverage items, bottleneck items, and non-critical items) according to two dimensions: profit impact and supply risk. The original Kraljic (1983) approach is presented in *Figure 6*. There have been many variations of the original Kraljic (1983) approach but the differences to the original one are minor (Gelderman & van Weele 2003). For example, Olsen & Ellram (1997) and Bensaou (1999) have developed portfolio models towards supplier relationships instead of purchasing items. In their model, the dimensions for classifying products are importance of purchasing and complexity of supply market. After classification, the required supplier relationships for delivering the products in each category are analyzed. This is followed by the development of action plans to bridge the gap between current and required supplier relationships. Separate buyer-supplier relationships should not be treated in a similar manner (van Weele 2005).

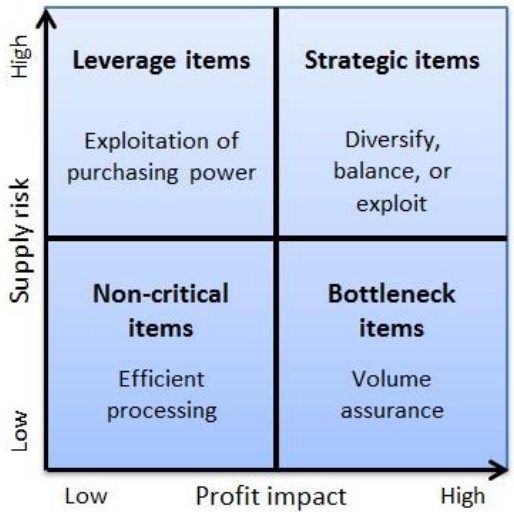


***Figure 6.*** *The original Kraljic approach (Kraljic 1983)*

Trautmann et al. (2009a) argue that purchasing portfolio models focus mostly on achieving economies of scale which is why they have developed portfolio models for other forms of purchasing synergies as well (purchasing synergies will be showcased later in this chapter). They use synergy potential and strategic importance as the dimensions in their model. Strategic importance is measured by two key factors: competence factor and economic factor (Trautmann et al. 2009a; Olsen & Ellram 1997). The competence factor indicates the impact a certain purchase has on the core competencies of the company. Economic factor indicates the impact that a certain purchase has on the company's profits. Synergy potential is measured differently for different synergies. Synergy potential for economies of scale are measured by the degree of volume aggregation and scope of relevant supply market, by purchase difficulty and supply risk for economies of information

and learning, and by transaction volume and process complexity for economies of process.

According to Olsen & Ellram (1997), portfolio models are not suitable for daily business situations and should be used as a strategic tool in combination with other methods instead. For example, Smart & Dudas (2007) complement their decision-making framework with spend analyses. Gelderman & van Weele (2003) consider portfolio approach a major breakthrough in the development of professional purchasing. Portfolio models simplify complex situations and therefore help to differentiate purchasing strategies which has led to their common use (Gelderman & van Weele 2003; van Weele 2005; Lamming & Harrison 2001). Heikkilä & Kaipia (2009) find this simplification also the pitfall of portfolio approaches.

Another premise for the development of category management is achieving synergies in purchasing which is the motivation for implementing global sourcing (Heikkilä & Kaipia 2009). Synergy is achieved when multiple business units combine their purchasing to gain competitive advantage through cost efficiency. Business units realize synergy by exploiting interrelationships, sharing know-how and resources, coordinating strategies and pooling negotiating power (Faes et al. 2000; Vizjak 1994). Rozemeijer (2000) has defined purchasing synergy as "the value that is added when two or more business units (or purchasing departments) join their forces (e.g. combined buying) and/or share resources, information, and/or knowledge in the area of purchasing". In purchasing, sources of synergies include economies of scale, process, and learning (Faes et al. 2000; Rozemeijer 2000). Trautmann et al. (2009a) and Arnold (1997) have also divided purchasing synergy into three main categories: economies of scale, economies of information and learning, and economies of process. Economies of scale are formed by lower unit costs through bundling volumes and standardizing categories. The terms pooling and pooled purchasing power, referring to economies of scale, are also common in purchasing synergy literature. For example, they are used by Goold & Campbell (2000). Economies of information and learning mean sharing information and knowledge across different parts of the company. Economies of process are related to benefits from establishing a common way of working and best-practice purchasing procedures across the company.

Trautmann et al. (2009) have also studied which synergy is pursued in different situations and how this affects the information processing and integration mechanisms used in global sourcing. Economies of scale is pursued when standard products are procured in high or medium volumes and demand is relatively stable while supply market is competitive making the delivery risk low. This type of category needs standardized purchasing processes with clear roles and responsibilities. Economies of information and learning are pursued in new buying situations with highly customized products with high volume, high criticality and irregular demand making the delivery risk high or medium. Category manager's responsibility is to transfer category and market knowledge and approval of sourc-

ing decisions while the purchasing process itself is differentiated among cases. Economies of process are pursued when standardized, low volume products with irregular demand and high quantity of orders are procured. Purchasing is decentralized but purchasing processes are standardized across the company.

## 2.4 Category strategy in procurement strategy hierarchy

Strategy is at the core of every company. It links and ties all the functions and actions of a company as an entity together. Category management involves strategic decision-making and linking procurement to the objectives of business units. Therefore, category management can be considered to be a strategy process for deploying strategy to the lower level. Category-level strategies are included in Hesping & Schiele's (2015) strategy hierarchy. Strategy hierarchies deploy the main strategy of a company to different functional levels. According to Hesping & Schiele (2015), it is difficult to have a single strategy in procurement encompassing different categories and suppliers. Instead the general strategy should be deployed as a hierarchy to different levels of procurement to form executable and controllable activities (Hesping & Schiele 2015). Nollet et al. (2005) support this argument by concluding that strategy development in procurement composes of a series of plans. Hesping & Schiele (2015) propose this series to include firm strategy, purchasing strategy, category strategies, sourcing levers, and supplier strategies. These strategies compose a strategy hierarchy from the company-level firm strategy to the supplier-specific supplier strategy. Firm strategy should direct the company towards its vision and purchasing strategy, as a functional strategy, should be the link between firm strategy and procurement organization. Hesping & Schiele (2015) have extended purchasing strategy with category strategies to adapt it to different supply markets. In Hesping & Schiele's (2015) article, sourcing levers refer to tactics applied to specify category strategies. The term originates from Schuh & Bremicker (2005). Supplier strategies are aimed at each supplier within a category. This study does not focus on the levels of firm strategy or purchasing strategy so they are not included for a closer review. Hesping & Schiele's (2015) framework is presented in *Figure 7*. They based their framework on González-Benito's (2007) framework of purchasing competence in which Hesping & Schiele (2015) considered the levels of sourcing categories and sourcing levers to be missing.

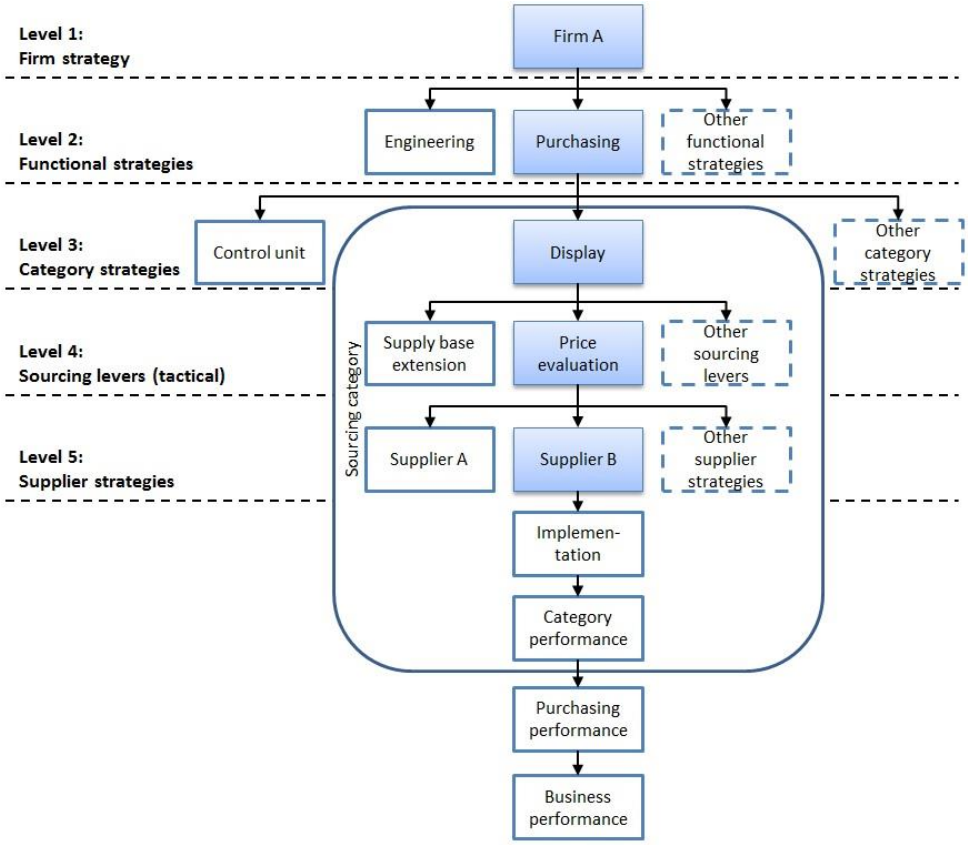


***Figure 7.*** *Five levels of strategy development in purchasing (Hesping & Schiele 2015, based on González-Benito 2007)*

Category strategy describes the category level of strategy development (Hesping & Schiele 2015). They build upon the foundation of portfolio models. In 1983, Kraljic (1983) already proposed different strategies to be used for different categories of purchased products instead of one purchasing-level strategy followed for all categories. Essig (2011) has also stated that strategic sourcing decisions specific for a single category and their supply market conditions are more important than the all-inclusive purchasing strategy. Procurement should develop specific strategies for similar supply markets or purchasing categories (Cousins et al. 2008; Karjalainen & Salmi 2012). Often, generic norm strategies are defined for all sourcing categories within a quadrant of the portfolio matrix (Kraljic 1983; Monczka & Markham 2007). These generic strategies have been criticized for excessive simplifying (Gelderman & van Weele 2005; Luzzini et al. 2012). Hesping & Schiele (2015) argue that category managers should follow an individual strategy for each category even if they were in the same portfolio quadrant. Category strategies should follow the functional purchasing strategy which is "a master plan for coherence and integrity" (Nollet et al. 2005, p. 137) ensuring that category strategies and purchasing strategy contribute to corporate and business strategic objectives. A central argument of sourcing category approach is the opportunity of forming differentiated strategies for specific factors of diverse supply markets. They can simultaneously help to achieve the functional purchasing strategy. (Hesping & Schiele 2015)

Sourcing levers form the next level in the category strategy hierarchy. They are used to plan a combination of activities for each sourcing category on a tactical level (Hesping & Schiele 2015). Schiele (2007) defined sourcing lever as "consisting of a set of similar activities that are used to improve the firm's sourcing performance in a sourcing category". Schiele et al. (2011) refer to sourcing levers as tactical building blocks of a category strategy. According to Luzzini et al. (2012), most publications only consider the first steps of portfolio models (i.e. the category strategy part) while some focus on the planning of actions and tools to realize these strategies. Hesping & Schiele (2015) consider sourcing levers the missing link between formulating category strategy and implementation of activities towards a single supply market. They are more common in German academic literature than in English publications.

Schiele (2007) and Schiele et al. (2011) have included seven different sourcing levers in their taxonomy which Hesping & Schiele (2015) consider the most empirically elaborated lever taxonomy. The sourcing levers are pooling of demand, price evaluation, extension of supplier base, product optimization, process improvement, intensification of supply relationship, and commodity-spanned. Hesping & Schiele (2015) consider the first three levers transaction-oriented and focused on the procurement organization alone. Other levers include innovation and collaboration with suppliers and other functions, such as product development (Schiele et al. 2011). Some authors do not use the term sourcing lever but their definitions share a lot of similarity with sourcing levers as an implementation tool of strategy on a tactical level in procurement. Narasimhan & Das (2001) speak of purchasing practices as "activities that relate to the purchasing-supply interface". They present three classes of practices: supply-base leverage, buyer-supplier relationship development, and supplier performance evaluation. The difference with Schiele et al. (2011) is that Narasimhan & Das (2001) use purchasing practices for specifying a functional strategy when sourcing levers decompose general strategy at the category level (Hesping & Schiele 2015).

Several levers can be used to support a category strategy (Hesping & Schiele 2015). Overall result of combining activities is emphasized instead of using them individually. Nevertheless, the chosen set of sourcing levers should be consistent and they should form a coherent sourcing strategy (Schiele et al. 2011). Category strategy plays an important role in selecting the sourcing levers (Hesping & Schiele 2015). Sourcing levers translate the category strategy into specific actions at a tactical level.

Hesping & Schiele (2015) propose the final level of the strategy hierarchy to be supplier strategy. Category strategies and sourcing levers refer to groups of materials and services purchased so decision makers must choose the suppliers from which the company buys from. The sourcing levers are translated into strategies for the category's supplier. A supplier strategy is used to describe how to approach an individual supplier in a category. One category can have multiple suppliers so supplier strategy and category strategy are

not the same. One category can have different supplier relationships and supplier selection criteria (Kaufmann et al. 2012; Masi et al. 2013). Diverse supplier roles and capabilities are reflected by applying different supplier strategies in one category (Hesping & Schiele 2015). For example, one supplier can be a partner while the other is a challenger. One supplier can also be part of multiple categories which poses a challenge for harmonizing supplier strategies across all categories (Hesping & Schiele 2015).

Supplier strategy is easy to confuse with some of the sourcing levers like extension of supply base. Hesping & Schiele (2015) argue that extension of supply base as a sourcing lever has different effect on different suppliers. For example, a current supplier's status might be reduced while another supplier becomes more important in volume. In this case one sourcing lever affects multiple supplier strategies (Hesping & Schiele 2015). In the end, supplier strategy directs the development of a buyer-supplier relationship. This thesis will focus on the level of category strategy. It forms the foundation for the lower levels of strategy hierarchy. This is the level of strategy hierarchy where the involvement of business units is important and it requires integration between business units and procurement.

## 2.5 Category management in practice

Purpose of category management is to contribute to the strategic goals of a company by managing supplier base through category-specific sourcing strategies (van Weele 2014, p. 193-200). O'Brien (2009) emphasizes cross-functional collaboration as a central part of category management. According to Heikkilä & Kaipia (2009) and van Weele (2014, p. 193), it is not rare to encounter category management in industrial firms. Hesping & Schiele (2015) have noticed an interest among academic scholars towards category management (for example, Monczka & Markham 2007, Akin et al. 2010 and Luzzini et al. 2012). Category management has been researched less than other subjects in procurement, e.g. procurement organization and centralization versus decentralization. Some subjects, such as purchasing portfolio approaches, share similarities with category management and they have been under extensive research for a long time. Overall, there is no clear definition for category management.

There is also variety in the way how companies integrate category management into their procurement. Heikkilä & Kaipia (2009) have shown in their study that company practices vary greatly and different choices are made in category management practices and processes. For example, companies formed and managed categories very differently. Nevertheless, there are similarities among the category management of the companies studied. At the highest hierarchy level of categories, there are fewer categories supporting company's global operations and organizing. The logic varies on the second level of hierarchy. Also in all of Heikkilä & Kaipia's (2009) companies, category managers managed cross-functional teams which consisted of local, R&D, and quality personnel. Category

manager's responsibilities were to create category strategy, develop the category, communicate, and contract. They were considered to have a service role towards business divisions. According to Arnold (1999) and van Weele (2005) coordinated organizational structures with team arrangements are becoming more common also in purchasing.

The three companies in Heikkilä & Kaipia's (2009) study defined the term category differently. Company 1 defined purchasing categories as global, regional or local. A category consists of one or multiple raw materials having synergy between them. Company 2 defined purchasing categories as a group of items with the goal of combining purchasing volume and identifying lower total cost of ownership. For company 3, categories were a group of products or services which form an approachable entity on the global business level. The underlying logic behind the category management of all three companies was pooling similar items and centralizing the purchasing of these items to gain economies of scale and cost efficiencies. In addition, companies were motivated by centralization of PSM (purchasing and supply management) and improvement of skills and capabilities of PSM. In literature, Van Weele (2010, p. 216) has defined categories as groups of products and services which the company purchases and uses as an element in the value proposition for customers or internal company's operation. In comparison, Trautmann et al. (2009) have defined categories as groups of similar items needed for specific business activities of the firm. Trautmann et al. (2009) in their study considered the uncertainty in the category context to consist of five characteristics of which four are internal to the organization and relate to category characteristics: purchase novelty, purchase importance, category complexity, demand volatility, and supply market characteristic. Supply market characteristic is related to the supply environment of the category. According to O'Brien (2012) most important characteristic of a category is mirroring how the individual marketplaces are organized. In other words, O'Brien (2012) focuses on factors outside the firm for categorization and Trautmann et al. (2009) focus on internal business activities of the firm. The companies in Heikkilä & Kaipia's (2009) study formed categories according to business logic and requirements. While requirements are an internal factor, business logic shares the idea of O'Brien's external factors.

## 2.6 Summary of this section

Former research literature on category management is scarce but the change towards strategic procurement and integration with business units is present in many related research areas as this literature review implies. Literature review supports the research objectives of this thesis by emphasizing the importance of business integration in strategic procurement. Pagell (2004) also argues that there is a lack of research on the factors that enable or inhibit integration. Data-driven integration among other forms of integration between procurement and business units is important for the strategic decision-making in category management.

Category management has a significant effect on procurement as an organization and a function. Its roots are in portfolio approaches and purchasing synergies which are important for geographically dispersed procurement organizations. As Carter & Narasimhan (1996) proposed, routine, operational procurement can be decentralized but centralized control is required. Category management also emphasizes centralized control. As implied by the changing role of procurement, integration and partnership networks are key elements for strategic procurement. Culture and structure of the organization are also found to affect the way different functions communicate. Therefore, the way procurement is perceived by other functions affects its integration with them. Therefore, integration mechanisms and procurement's perceived role can be considered vital for effective category management. Many authors consider IT infrastructure as an important part of vertical integration. Data-driven business integration is the focus of this thesis since one of the purposes of category management is to bring procurement closer to business.

In addition, strategy formation and cross-functional collaboration can be considered important integration mechanisms for category management. Strategy formation with business units is more visible in the middle-to-lower levels of procurement strategy hierarchy, such as category strategy, sourcing levers, and supplier strategies. Category management emphasizes forming category strategies in collaboration with concerned business units as the objectives of the business units can provide important input for the strategy formation (O'Brien 2009). Often, the objectives of different business units are varied and procurement will have to be an integrator in-between. In other words, category strategies, sourcing levers and supplier strategies have to fulfill the needs of multiple business units.

# 3. DATA IN PROCUREMENT

## 3.1 Data utilization and information in procurement

The amount of data has exploded with the adoption of IT technology. Data in itself is not valuable which emphasizes the need for turning it into information. According to McAfee & Brynjolfsson (2012) more data travels every second through internet than was stored there 20 years ago. McAfee & Brynjolfsson (2012) also found that data-driven companies perform better than their counterparts when measured by financial and operational results which highlights the importance of data utilization in modern companies and procurement. In procurement, used data is often focused on spend, purchasing performance measurement and supplier measurement (Pandit & Marmanis 2008; Ho et al. 2010; Pohl & Förstl 2011). Data-driven integration between business units and procurement is not considered common (Pagell 2004).

Recently big data has become a very popular term. Its popularity has risen with other trends, such as Internet of Things (IoT). Studies give this popularity validity by stating that managers are able to make best decisions when they have the data and tools for analysing it (Davenport 2006). Authors define big data using the 5 Vs: volume, velocity, variety, value, and veracity (Laney 2001; Russom 2011; White 2012; Wamba et al. 2015). Volume refers to the large amount of data, velocity to the frequency or the speed of data generation, variety to the huge variety of data sources and formats, value to the economic benefits extractable by big data, and veracity to the importance of data quality. Hazen et al. (2014) consider big data as an emerging area in the field of procurement which could support competitiveness and transform the management of procurement. Still, the role of big data has been slowly identified by procurement professionals (Chae & Holson 2013; Hazen et al. 2014). Usage of big data has been recognized to provide many benefits in big data literature. It has been linked to efficiency, reactivity, transparency, quality, and productivity (Baker & Jayaraman 2012; Nakano & Oji 2012, Lau et al. 2013; Tirkel 2013).

In general, information needs vary greatly, especially between strategic and operational decision-making. Each company and procurement organization can have completely different information needs. Therefore, an all-inclusive, generic listing of managerial information needs is considered an impossible task. Roughly information sources can be divided into internal and external information (Uusi-Rauva 1994, pp. 5-6). Internal information consists of company specific information, such as production figures. External information is information on the external business environment, including competitors, customers, technologies, and suppliers.

Marakas (2003, pp. 90-91) has divided managerial decisions into three levels: strategic planning, tactical control, and operative monitoring. Different levels require different information. Bocij et al. (2003, pp. 20-21) argued that differences between operational and strategic information needs are remarkable. For example, information for operational needs is often more detailed while strategic management requires summarised information. Operational information is also more frequent and certain. External information is needed more in strategic decisions while operative monitoring focuses mostly on internal information. On the contrary, Herring (1992) and Thierauf (2001, p. 196) emphasized the need for both internal and external information for a company to perform valid strategic decisions. Hannula & Pirttimäki (2005) have divided managerial information needs into a three-dimensional "cube of business information". The axes are information subject, information source, and information type. Information subject and information source can be internal or external. Information type can be qualitative or quantitative. Cube of business information is an illustrative tool which allows approaching different information needs systematically.

## 3.2 Information processing

Former models clarify the properties of information. The way information is processed is of equal importance. Choo's (2002, p. 24) information management cycle is one of the most known generic information management process models. It is illustrated in *Figure 8*. In Choo's information management cycle, information management is a nonstop process with six phases: 1) *identification of information needs*, 2) *information acquisition*, 3) *information organization and storage*, 4) *development of information products and services*, 5) *information distribution*, and 6) *information use*. *Adaptive behavior* is considered to be the beginning of the cycle since organization's actions create information. These actions interact with other organizations and systems altering the environment and generating new messages and information. In the actual first step *Information needs*, members of the organization seek information about the environment in order to clarify the situation, and to have the information needed for decision-making and problem-solving. *Information needs* are characterized by the subject's requirements and the situational contingencies. Different problems and decision-making situations require different kind of information. (Choo 2002, p. 24)

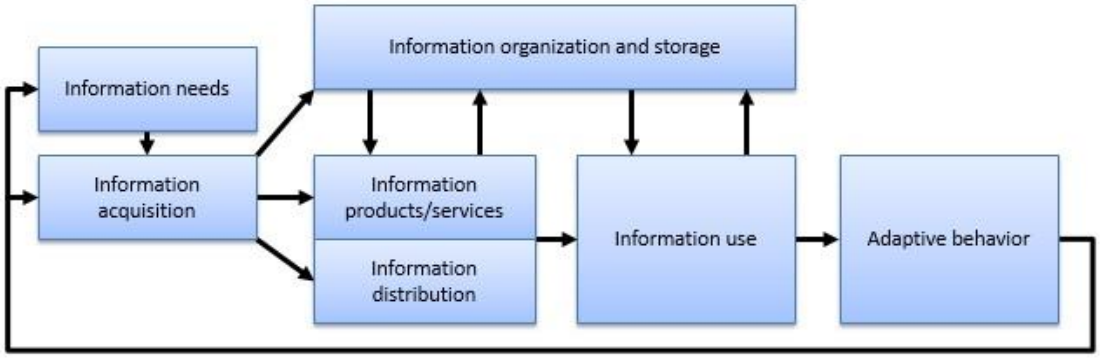


***Figure 8.*** *Information management cycle (Choo 2002, p. 24)*

According to Choo (2002, p. 24) *information acquisition* is driven by *information needs*. It is a complex function due to the fragmentation and specialization of information. Choo (2002, p. 24) argues that existing sources should be constantly evaluated and new sources assessed. In addition, the matching of sources and needs has to be regularly re-evaluated. In *information organization and storage*, an organizational memory is created as an active repository of the organization's knowledge and expertise. The data has to be structured to reflect the interests and usage of the organization and its members (Choo 2002, p. 25). Choo (2002, p. 25) considers information technology to provide significant benefits in this area. It can improve the efficiency and reliability of the organization's operational activities. Integrated information management policies can ensure that relevant information about the past and present are preserved and available (Choo 2002, p. 25).

In the next phase, acquired and stored information are packaged into different levels of *information products and services* targeted at different user groups and needs of the organization. Choo (2002, p. 25) specifies that this is not a passive repackaging of data but instead *the information products and services* have to add value by enhancing the quality of the information and improving the fit between information and the needs. *Information distribution* is aimed at increasing the sharing of information. Information sharing contributes to organizational learning. It can create new insights and knowledge. Best possible information should be available for the end-users supporting the users' work patterns. *Information use* refers to the creation and application of information in interpretive and decision-making processes. Interpretive use involves social construction of reality which should be supported by information representation and delivery. Information use for decision-making means selecting alternatives. Choo emphasizes that "information provision and content should accommodate the kinetic and nonlinear nature of the decision process". (Choo 2002, p. 25)

Probst et al. (2000, p. 30) have presented an alternative model for information management. It has six phases: 1) knowledge identification, 2) acquisition, 3) development, 4) sharing and distribution, 5) utilization, and 6) retention. Probst et al. (2000, p. 30) emphasize the close relationship of the phases regardless of them being individual processes. Instead they should be considered as a unified whole. Being generic, the six phases in

Probst et al. (2000) share a lot of similarities with Choo's (2002) model. First phase is closely related to Choo's information needs followed by acquisition. Probst et al. (2000) speak of knowledge development while Choo (2002) has information products and services. The remaining phases in both models include storage, utilization, and sharing of information.

This thesis will focus on select parts of the information processing framework. Information needs, distribution, and use can be considered vital from the viewpoint of integration mechanisms. As Tushman & Nadler (1978) and Trautmann et al. (2009) propose, effective information processing requires a fit between information processing requirements and information processing capacity. Information needs describe the information requirements while information distribution and use affect the information processing capacity. In Probst et al. (2000) model, the concerned phases are knowledge identification, sharing and distribution, and utilization.

## 3.3 Information systems and procurement data

Most of the structured information in procurement comes from IT systems. By definition, IT can be considered to include hardware, software, telecommunications, and the personnel and resources for supporting the IT (Weill 1992). The definition is old but the same principles still apply. Sriram et al. (1997) consider the IT investments made by organizations to vary greatly. They have studied the IT investments made in purchasing organizations. They divide purchasing-related information systems into three groups reflecting the scope of use:

- Base systems and support (both hardware and software)
- Vendor communications interface (enabling technology)
- Purchasing-specific applications/practices utilizing the technology, e.g. to automate ordering processes and purchasing vendor evaluation

According to Sriram et al. (1997), each of these groups support a different aspect of the purchasing function. Base systems and support for them provide a standardized infrastructure for the inter-departmental interactions. Vendor-communications interface works as an enabling technology for inter-firm communication and exchange. Purchasing-specific applications provide support for intra-departmental operations. Sriram et al. (1997) conclude their study by proposing that IT investments supporting specific functions must be treated as heterogeneous, and they should be based on objectives, strategies, and tactics of the purchasing function while simultaneously being sensitive to company's policies, strategies, resources, past IT investments, and external environment.

Although, this division was first presented twenty years ago, it can still be considered valid. The underlying principles behind IT systems have not changed even if the technol-

ogies themselves have developed greatly. Authors, such as Sriram & Stump (2004), González-Benito (2007a) and Rodríguez-Escobar & González-Benito (2015), have recently built on the work of Sriram et al. (1997). Their contributions focus mostly on the relationship between IT investments and purchasing performance. Sriram & Stump (2004) conclude their study by showing that IT investments have a relationship with increased purchasing performance, although, this relationship is not direct. González-Benito (2007a) builds on this by arguing that IT investments improve operational performance in the purchasing function by two variables with a mediating role: implementation of advanced purchasing practices and the degree of strategic integration of purchasing function. This implies that IT systems have a significant effect on the integration of procurement. Rodríguez-Escobar & González-Benito (2015) support this by stating that IT investments do not have a direct relationship with purchasing performance but they enhance the implementation of advanced purchasing practices and intra-organizational integration. Therefore, they can be considered as prerequisites for the development of procurement category management and business integration in procurement.

Many authors consider spend data the main source of information in procurement. As mentioned earlier, internal information is linked to operative decision-making. Therefore, relying solely on spend data in a strategic function can be criticized. Carr & Pearson (2002) consider it important for procurement to become proactive if it wants to be considered strategic. Proactive, external information of supplier markets is an important part of strategic decision-making in procurement (Carr & Pearson 2002). Nevertheless, spend analysis is associated with strategic sourcing (Guttman et al. 2005, p. 117; Pandit & Marmanis 2008, p. xv; Driedonks et al. 2010). According to Driedonks et al. (2010), it is difficult to form sourcing strategies if spend data is not easily available. In Smart's (2010) study, better visibility over spend was found essential in order to effectively manage sourcing strategy. A good visibility on spend allows identifying opportunities for strategic sourcing and expense reduction. Pandit & Marmanis (2008, p. 26-27) have listed multiple benefits of spend analysis:

- Visibility into all corporate spend
- Improved data accuracy and consistency
- Reduction in cycle time for custom reports and ad hoc analyses
- Reduction of off-contract spend
- Identification and prioritization of savings opportunities
- Savings through supplier consolidation and contract negotiation opportunities
- Compliance improvement

Spend is divided into direct, indirect, and MRO (maintenance, repair and operations) spend (Guttman et al. 2005, p. 117-118; Pandit & Marmanis 2008, p. 85-87). Direct spend relates to the procured products and services which are used in the products or services sold by the procuring company. Indirect spend relates to procured products and services

which are used by the company in day to day operations but are not part of its offering, e.g. travelling. Spend analysis is an umbrella term for multiple strategic activities important for sourcing strategy formation (Guttman et al. 2005, p. 119-122; Pandit & Marmanis 2008, p. 101-104). The activities include data warehousing and cleansing, sourcing initiatives seeking, and data mining and analysis. Data cleansing can include normalization of the data; e.g. different names relating to one supplier have to be the same. This is often needed as the data needed for spend analysis can come from multiple IT systems and supplier names, commodity names, and procuring organizations have to be normalized across the data from different systems. Failure to normalize transactional data is often the reason why attempts to implement spend analysis fail (Pandit & Marmanis 2008, p. 12). Spend analysis can be visualized as a multi-dimensional cube, often referred to as the spend cube (Pandit & Marmanis 2008, p. 16). A three-dimensional spend cube is illustrated in *Figure 9*.

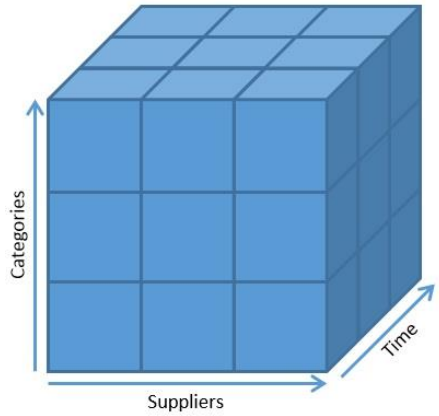


***Figure 9.*** *Spend cube (adapted from Pandit & Marmanis 2008, p. 16)*

Spend analysis creates a common schema between multiple systems allowing the data to be aggregated by multiple dimensions (Pandit & Marmanis 2008, p. 16). In *Figure 9*, categories, suppliers, and time are chosen as dimensions. Other dimensions can be included, such as, cost centers, divisions, geographies, and business units.

Other sources of information in procurement consist of suppliers and purchasing performance (Ho et al. 2010; Pohl & Förstl 2011). Supplier evaluation and measurement provide procurement organization data on the supplier base while purchasing performance measurement provides data on procurement performance and strategic alignment. A mature purchasing performance measurement system is considered to be important for achieving functional strategic integration (Pohl & Förstl 2011). Purchasing performance measurement systems can provide a wide variety of data on purchasing performance and supplier base, for example, delivery times, quality, total costs of ownership, flexibility, internal customer satisfaction and different buying ratios, such as maverick buying ratio or global sourcing ratio (Pohl & Förstl 2011).

## 3.4 Data utilization in travelling category

Business travelling has increased substantially in the past decades (Gustafson 2012). Reasons for increasing business travel are numerous, such as globalization and geographically expanded markets (Aguiléra 2008; Beaverstock et al. 2009). This has led companies to focus their cost reduction programs on business travelling and they are also increasing the utilization of alternatives for business travel called virtual mobility (Mason 2002; Singh 2007; Millar & Salt 2008; Gustafson 2012). The main driver behind business travel is the importance of personal contact. Ivancevich et al. (2003) consider many business activities to rely on direct, personal contact and communication. Face-to-face interactions can be considered important for closing deals, solving problems, negotiating contracts, and developing trust and respect. Dwyer et al. (2000) also emphasize the interaction between a customer and a sales person as critical for successful sales.

Ulaga & Eggert (2006) proposed personal interaction as one of their nine value drivers in supplier-customer collaboration. Therefore, personal interaction can be considered to provide value to the customer and travelling can be considered the means for providing it. Hubbard (1990) has noted that most project failures are related to social issues which also supports the fact that personal interaction can have a significant impact in a business environment. There has been prior research on relationships between travelling and trade. Kulendran & Wilson (2000) studied the relationship between international travel and international trade. In their study, they found that there is a relationship between total travel, real exports, and real total trade between Australia and the United States, New Zealand and Japan which are also the most important trade partners for Australia alongside the United Kingdom. They found some evidence to support their "Marco Polo" hypothesis implying that business travel leads to international trade. This hypothesis was also tested the other way, and the results implied that international trade leads to international travel. They also found support for their third hypothesis, indicating that non-business international travel also leads to international trade. In this thesis, a similar phenomenon is studied in the scale of one company.

Travelling has also been linked to employee stress, and therefore, it can be considered to affect employee satisfaction (Striker et al. 2000; Ivancevich et al. 2003). Homburg & Stock (2004) found a link between sales people's job satisfaction and customer satisfaction. It is possible that well-organized and successful travelling and personal contact have an effect on sales people's job satisfaction and customer satisfaction, although, stressful business travelling can have the adverse effects. The relationship between job satisfaction and customer satisfaction was found to be stronger in the case of high frequency of customer interaction which also implies increased business travelling (Homburg & Stock 2004). Abbott (2003) has found conflicting results. She argues that there is no relationship between employee satisfaction and customer satisfaction. There are also conflicting views on the need of travel. Weber (2001) argues that the distance can be overcome by advances in information technology and communications, such as video-conferencing. Gustafson

(2012) has also recognized virtual meetings as an alternative for travelling. Gustafson (2012) argues that travel management involves "meetings management" in modern organizations. In other words, travel managers also take charge of rules and routines for meetings to ensure the most appropriate form is chosen for each meeting. Often, meetings are included in travel policies. Travel managers also become responsible for the technological infrastructures related to the virtual meetings.

Data on corporate travelling has changed dramatically during the last 15 years due to centralized end-to-end expenditure management process allowing better analysis of the data (Singh 2007). End-to-end travel expenditure management limits unnecessary or unauthorized travel spending but it also combines the booking of travels and capturing expense data allowing the travel expenditure data to be more real-time. It will also improve the utilization of economies of scale since employees booking travels are practically forced to select preferred suppliers. This offers multiple benefits. Economies of scale utilization often provides cost savings for companies which is also the case for travelling expenses (Singh 2007). It will also allow more accurate analysis of the data since travel and expense data is generated real-time at the time of the travel instead of with a delay.

Travelling category and travelling managers are often assigned under procurement organization. Historically, travelling category has been a target for cost reduction programs. Travelling category has its own supplier base and therefore, it is often considered a separate category in many corporations. Travel managers have a variety of responsibilities in their category. Gustafson (2012) has identified travel statistics utilization as one of the six responsibilities of a travel manager serving two purposes. First, they are used in negotiations with suppliers. Second, they are used to analyze travel activity, monitor policy compliance, and identify possibilities for cost reductions. Both of these purposes can be applied to any category within procurement, not just travelling category.

## 3.5 Summary of this section

Data and information derived from it are one of the many building blocks of successful decisions. Data-driven companies have been associated with many positive organizational qualities, such as efficiency and reactivity (Baker & Jayaraman 2012; McAfee & Brynjolfsson 2012; Nakano & Oji 2012, Lau et al. 2013; Tirkel 2013). Data and information are often generated through an unrecognized process, such as information processing framework of Choo (2002). Generic models on information processing are similar and often, they start with information needs or requirements. The cube of business information by Hannula & Pirttimäki (2005) describes organizational information needs and it is used as a basis for the interviews alongside chosen parts of the information processing framework of Choo (2002). The cube of business information provides a framework for categorizing information needs of the interviewees while specific interview questions are aimed at different parts of the information processing framework of Choo (2002).

Information systems are an important vertical integration mechanism. Information systems are divided to strategic, transactional and informational information systems (Weill 1992). IT systems of all three types are used in procurement. They also provide the basis for the collection of information and data in procurement, such as spend data. Spend data and spend analysis are fundamental for strategic procurement (Driedonks et al. 2010). Spend data includes a major share of the data used in procurement while data-driven business integration is not very visible in the current literature. Obviously, there is a need for more research in this area since focusing on spend data alone gives a very narrow and cost-focused view on the spending and procurement of a company.

This thesis will focus on data-driven business integration in procurement category management. Travelling category is chosen as an example for data integration from business and procurement. Literature emphasizes the need for travelling as a medium for conveying personal contact. Personal contact has been linked to successful sales and satisfied customers in many studies, such as, Dwyer et al. (2000), Ivancevich et al. (2003) and Ulaga & Eggert (2006). As business travel increases, companies are becoming more cost-conscious about its benefits and associated costs which has increased the usage of alternatives for business travel, such as virtual meetings. Former literature emphasizes the need for business travel which increases the importance of investigating its benefits in practice. Many authors offer support for the hypotheses of the statistical analysis of this thesis. The links between former literature and hypotheses of the statistical analysis are shown in *Figure 10*.

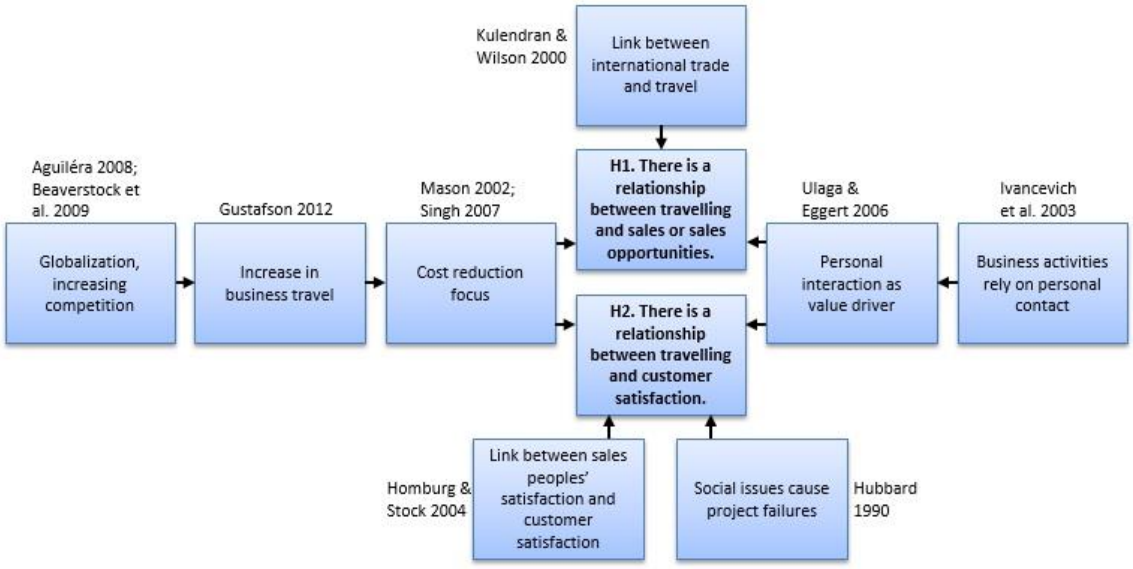


***Figure 10.*** *Former literature and the hypotheses of the statistical analysis*

This thesis focuses on data-driven integration between procurement and business units by using the example of travelling category. Statistical analysis between travelling, customer satisfaction, sales, and sales opportunities offer a good example of such integration by

combining data from business units and procurement into one analysis. If results are successful, similar analysis could be conducted with other combinations of data. Spend data provides data from the viewpoint of travelling from procurement while customer satisfaction and sales data come from business units. Former studies have found a positive relationship between international travel and trade (Kulendran & Wilson 2000) implying that personal contact and travelling have a significant effect on the outcomes of business relationships. This study focuses on a similar matter in the scale of one company instead of focusing on the national economy as a whole. Personal interaction is considered a value driver in business relationships (Ivancevich et al. 2003; Ulaga & Eggert 2006). In this thesis, customer satisfaction is chosen, alongside sales and sales opportunities, as a positive outcome of personal contact in business relationships and travelling is considered to be the measure of personal contact.

# 4. METHODOLOGY

## 4.1 Case context

Case company of this thesis is a large ICT (information and communications technology) company operating in Northern Europe. Case company employs over 10 000 employees and has yearly net sales of over a billion euros. Their offering consists mainly of services and production is characterized by a project production. Purchasing spend covers approx. 50 per cent of all costs. The case company has about 7 000 suppliers which are divided into two classes. One third of purchasing spend is materials while the remaining two thirds are services.

The case company's procurement has adapted category management five years ago with the main goal of being closer to business. The interviews of this thesis will focus on a successful, large sales case which is considered to represent desired practices of category management. Management of procurement considers category management to have advanced integration with business, although change is considered to happen slowly. Interviews also provide the point of view of the concerned business unit on the integration between procurement and business. Procurement is considered to be highly mature but data utilization and data-driven integration with business units is considered a challenge by procurement managers.

This thesis focuses on a success case in the case company. The selected success case was a considerably large sales case of the case company. This case was selected because management in procurement considered it to be successful from both the perspective of procurement and business. Also, the category management was adopted to a further degree with the sales case's business unit compared with the other business units. The success case was considered to represent desired practices of category management. For example, the category manager in charge of the success case in procurement was highly regarded in both procurement and the business unit responsible for the selected success case. Success case should offer interesting results on the effect of category management on business integration when the relationship between procurement and the related business unit is compared with other procurement-business unit relationships in the company.

## 4.2 Interviews

In the first phase of the empirical part of this study, interviews were conducted to reveal how the role of procurement and the current state of data-driven integration between procurement and business is perceived in the company at the moment of the study. Interviews were considered an appropriate method for this phase because the final form of the second empirical part was not yet formulated (Saunders et al. 2009, p. 318). The main purpose

of interviews was to be exploratory and look for possible opportunities for the second empirical part of this thesis. Secondary objective was to clarify category management as a concept.

In total, eleven persons were chosen for an interview using purposive sampling. Saunders et al. (2009, p. 233) emphasizes that the logical relationship between sample selection technique and the purpose of research is important and sample size should depend on research questions and objectives. In this case, typical case sampling was considered a relevant method for choosing the eleven interviewees. The chosen persons were considered important for versatile investigation of the selected success case and phenomenon at hand. Five interviewees were directly related to the selected success case. Rest of the interviewees were selected because they could provide a comprehensive view on procurement's role in the company in general. Interviewees included managers and personnel from business units, procurement, financing, and analytics. Interviewees' titles are shown in *Table 1*. In *Table 1*, the amount of interviewees per organization unit is shown.

***Table 1.*** *Interviewees per organization unit.*

| | |
|---|---|
| **Procurement** | 4 interviewees |
| **Analytics** | 2 interviewees |
| **Business** | 5 interviewees |

All interviews were recorded and transcribed. Interview responses were handled anonymously to ensure integrity. Interviews were exploratory by nature, focusing on the current state of data-driven integration and role of procurement in the company, and opportunities for improving the data-driven integration. Interviews were semi-structured and consisted of three main themes: 1) link to procurement and category management of procurement, 2) data utilization, and 3) selected case. According to Saunders et al. (2009, p. 322), semi-structured interviews can be used in an exploratory study to provide flexibility needed for exploring the complexity of the topic. Each interviewee group (procurement, business and analyst) was interviewed with a personalized interview structure to reflect the position of the interviewee which is common for semi-structured interviews (Saunders et al. 2009, p. 320). For example, certain questions were aimed more at personnel from procurement than other functions. Interviews for each group are attached in *Appendix 2, 3, and 4.*

Saunders et al. (2009, p. 326) consider three issues important regarding the quality of data from interviews. These issues are reliability, forms of bias, and validity and generalizability. Reliability refers to the repeatability of the study, i.e. if other researchers would find similar results. Marshall & Rossman (1999; from Saunders et al. 2009, p. 328) do not consider reliability relevant in a situation where the interviews are not intended to be

repeatable. In this case, interviews reflect a specific time in a specific situation which is subject to change. The explored situation is dynamic since the case company is still adopting a new way of managing procurement. Therefore, they are not repeatable. According to Saunders et al. (2009, p. 326), biases related to the interviewer and interviewees are worth considering when conducting a semi-structured interview. Interviewer biases are created by the comments, tone and non-verbal behavior of the interviewer. Same interviewer conducts all interviews with the aim of being neutral which can be confirmed from the recordings. Interview themes and questions are neutral by tone and they do not impose any beliefs to the interviewees' responses. Interviewee bias relates to the interviewee's perception of the interview. Interviewee might not reveal all necessary information or discuss all aspects. This is solved by interviewing persons with a similar link to the selected case instead of relying only on one interviewee per point of view. For example, multiple persons are interviewed from the perspectives of procurement, business and analyst. Interviews were also anonymous which will reduce the biases of interviewees.

The issue of validity refers to "the extent to which the researcher gains access to their participants' knowledge and experience, and is able to infer a meaning that the participant intended" (Saunders et al. 2009, p. 327). This issue is approached by using questions which can be clarified by supportive questions. The interviewees are presented a data framework presented in *Figure 11*, based on Hannula & Pirttimäki (2005), which they can rely on if necessary. The issue of generalizability refers to whether the results of the interviews can be generalized on a larger scale. The number of interviews is small and no statistical generalizations can be made from them. Interviews were exploratory, designed to investigate a specific case instead of generalization on a larger scale.

The questions in interviews are listed under three themes: 1. Link to procurement and category management for procurement personnel, 2. Data, and 3. The selected case. Questions under theme "1.Link to procurement" are aimed at business and analysts to find out how they are in contact with procurement and how they perceive procurement's role through the decision-making done with procurement. Procurement personnel are also asked about the category management. They are asked to define category management in their own words and open up the decision-making and roles related to category management. Questions under theme "2.Data" are asked from all interviewees. The main purpose is to investigate the data integration between procurement and other functions and what expectations and opportunities different personnel have for this integration. At the beginning of this theme, a simplified version of Hannula & Pirttimäki's (2005) cube of business information is presented to the interviewees. The version used in interviews presents the axes of information source and information type. The simplified version is presented in *Figure 11*. Information subject is obtained through the answers to the questions but is not presented in the portfolio model to avoid confusion among interviewees. Data is a very broad theme so examples of possible, generic information sources are offered in the presented portfolio model to facilitate the thinking process of interviewees.

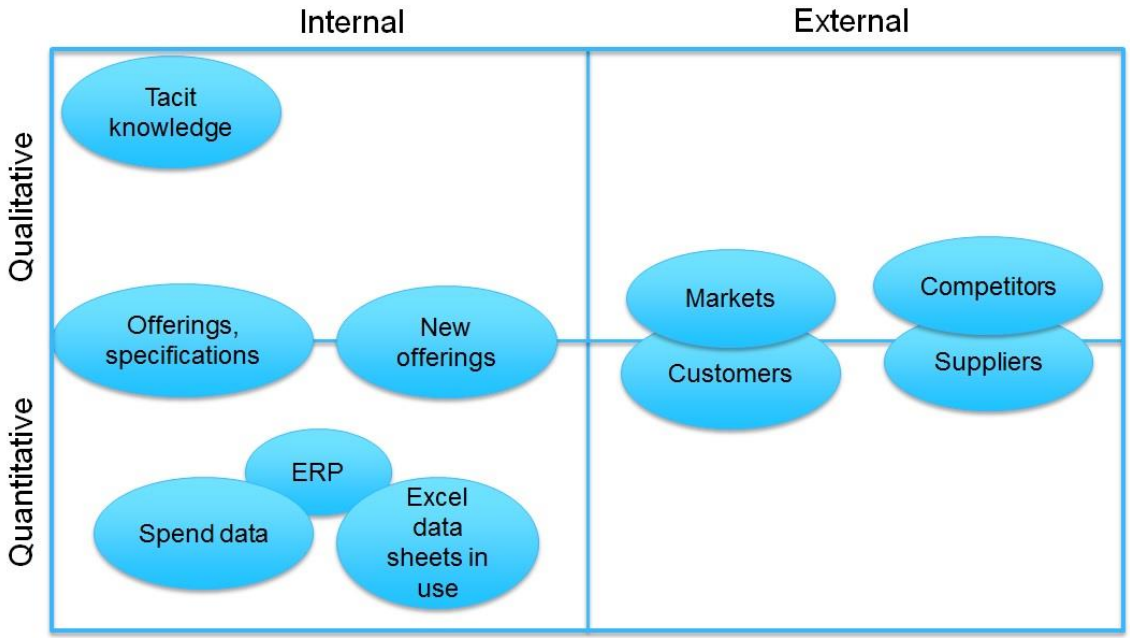


***Figure 11.*** *Simplified version of the cube of business information (adapted from Hannula & Pirttimäki 2005)*

Data-themed questions are based on Choo's (2002, p. 24) information management cycle presented in *Figure 8*. All phases of information management cycle are covered in the questions except adaptive behavior, and information organization and storage. Information needs and information acquisition are the focus of questions 2.1 and 2.2 in all interviews, including 2.3 and 2.3 in analyst interview. Information products, services and distribution are considered in questions 2.1, 2.2 in all interviews, and 2.4 in procurement and business interviews. Information use is covered in questions 2.1, 2.3, 2.5 and 2.6 in all interviews, including 2.4 in procurement and business interviews. Questions in the third theme, the case, were targeted at specifying the reasons of success for the selected case and role of procurement in the case. The role of data in the case was also investigated. The links between interview questions and findings of this thesis are illustrated in *Appendix 5*.

Finally, the results of the interviews were discussed in a group discussion with the representatives of the case company. Interviewees were also invited to join the group discussion. The group discussion lasted approximately an hour and the main themes were the ones in the interviews. The main purpose of the group discussions was to verify the interview results and secondary purpose was to discuss interesting findings of the interviews. The group discussions were also empirical material for this thesis. Comprehensive notes were formed of the key points of the group discussion.

## 4.3 Statistical analysis of integrating data from procurement and business functions

Literature review concluded on the importance of personal contact in business relationships which is also the focus of the second empirical part of this thesis. Proactive information from procurement to business units was considered valuable by both business units and procurement in the interviews and therefore, correlation calculations to investigate the strength of the linear relationship between travelling, customer satisfaction and sales data were chosen for the second part of this thesis. If there was a significant correlation with sales forecasts and travelling, this could offer opportunities for travel cost estimation which could provide business units useful and proactive information.

The correlation calculations are also an attempt to integrate data from both a business unit and procurement into one analysis. Spend data on travelling comes from procurement while sales data and customer satisfaction data come from a business unit. Similar integration of data was not done earlier in the case company. The results of the second phase of this thesis are two-fold. The main objective is to investigate possibilities and opportunities for improving data-driven integration in procurement category management. Benefits, challenges, and alternative applications for this kind of an approach are interesting results. The results of the calculations can also offer valuable information for decision-making which is the secondary objective. If the results were considered valuable, similar integration could be applied to other data pairs to investigate the relationship between a cost and value provided by it. In this case, travelling represents costs while customer satisfaction, sales, and sales opportunities are value outcomes of personal contacts. Customer satisfaction is considered to relate to travelling that is done after a sales deal, while travelling before a sales deal is considered to relate to sales and sales opportunities.

Chosen data sets, variables and hypotheses of correlation calculations are shown in *Figure 12*. The data sets included multiple variables. The data for these variables already existed in the case company's information systems and no additional data collection was needed. All data was divided monthly and per delivery project except opportunity and sales data which was divided only monthly. A sales information tool provided data for weighted opportunity value, sales and contract value, number of active opportunities and number of opportunities that were won. The percent of won opportunities was calculated based on the last two variables. A sales case was considered an opportunity when a quotation is prepared for the customer. Therefore, the number of active opportunities included all opportunities, such as quotations and done sales deals while the number of won opportunities only included the quotations which ended up increasing the sales of the case company. Dividing won opportunities by all active opportunities gives the monthly percentage of opportunities which become sales cases, i.e. the average chance to win a case. A weighted opportunity value included the monetary value of each active opportunity in

each part of the sales process multiplied by a chosen percentage (i.e. the chance of winning the opportunity) specific for that part of the sales process.


***Figure 12.*** *Data sets, variables, and hypotheses for correlation calculations.*

Travelling was divided into total travelling, customer-billable travelling, and non-customer-billable travelling. The monetary value of travelling was used in the calculations, i.e. the combined cost of all travel expenses per month and per delivery project. Customer satisfaction was measured with a customer satisfaction survey (called DQP) which was sent to customers at least once during a delivery project. The survey included five numerical survey questions in which respondents gave a grade between 1 and 4 (4 being the best and 1 the worst). The survey also included three open questions but these were not included for the correlation calculations because they could not be quantified for the calculations. When the five survey questions were compared, a high correlation was found between all of them. Therefore, the average of the five questions was used to represent customer satisfaction in the calculations. If the customer satisfaction survey was sent multiple times during a delivery project, an average of all surveys for that delivery project were used. The shortened name for the customer satisfaction survey, DQP, is used in this thesis. Additionally, certain variables were used to categorize projects by size. These included work hours per delivery project and off-shore work hours per delivery project. Additional information, such as mean, standard deviation, minimum, and maximum, are shown in *Table 2* for some variables. Information on the data from sales information tool is left out from *Table 2* due to the sensitivity of the data for case company's business.

***Table 2.*** *Information on the variables of the statistical analysis.*

| | N | Mean | Stan. Dev. | Min | Max |
|---|---|---|---|---|---|
| Customer-billable travel per month | 36 | 258 323 € | 80 426 € | 130 930 € | 420 215 € |
| Non-customer-billable travel per month | 36 | 199 368 € | 67 047 € | 69 844 € | 356 595 € |
| Total travel per month | 36 | 457 692 € | 142 903 € | 209 487 € | 752 007 € |
| DQP average | 155 | 3,5 | 0,5 | 1,6 | 4,0 |
| Hours | 155 | 896,1 | 2220,1 | 0,0 | 18917,6 |
| Off-shore hours | 155 | 311,0 | 972,3 | -59,0 | 9434,3 |
| Customer-billable travel per project | 155 | 14 973 € | 42 433 € | 6 € | 278 729 € |
| Non-customer-billable travel per project | 155 | 7 € | 65 € | -9 € | 697 € |
| Total travel per project | 155 | 14 981 € | 42 436 € | 6 € | 278 729 € |

Historical data was used in the statistical analysis. The data of both the sales information tool and travelling were collected from the 1st of January, 2013 to the 31st of December, 2015. The sales information tool provided monthly data of a single business unit. The data on travelling costs consisted of 9 732 travel expense reports from the same business unit with the same time interval (2013-2015). Travel expense reports were compiled per project number and per month. Monthly travel costs were paired with sales information tool data in the first data set for statistical analysis. Sales information tool data and travel expense data can be considered to represent the years 2013-2015 well. Customer satisfaction data consisted of 3 407 customer satisfaction survey reports for 2 076 unique projects between the years 2014 and 2016. Of these 2 076 unique projects, 155 projects had both travel expense reports and customer satisfaction survey reports assigned to their project number. The 155 projects were considered to involve travelling and were chosen for the statistical analysis. The travel expense reports per project and customer satisfaction survey reports assigned to these 155 project numbers formed the pairs in the second data set for the statistical analysis. They can be considered to represent projects which involved travelling well.

The strength of linear relationship between the variables were calculated with Pearson's correlation coefficient. Saunders et al. (2009, p. 459-460) recommends using Pearson's correlation coefficient when variables are continuous and numerical while Kendall's rank correlation coefficient and Spearman's rank correlation coefficient should be used with ranked data. Because the data consists of continuous variables and linear relationships are considered interesting, Pearson's correlation coefficient is considered the most appropriate method for the purposes of this thesis.

Calculations were formed using "IBM SPSS Statistics 23"-software and "Bivariate correlations"-tool. Pearson's correlation coefficient was calculated for all pairs of variables with a similar amount of observations (n-value) and the same unit of analysis. Two-tailed test was chosen because both directions of the relationships were found interesting. Significant correlations were flagged at $p<0,05$ and $p<0,01$ levels. p-value states the probability of the results of the correlation calculations occurring by chance alone (Saunders et al. 2009, p. 459). Therefore, it was used to estimate the legitimacy of the correlation re-

sults. Relationships with a p-value higher than 0,05 were not considered statistically significant. Variables were divided into two data sets of N=36 months (years 2013-2015) and N=155 projects. Variables and their names in SPSS are shown in *Table 3*.

***Table 3.*** *Variables in SPSS.*

| Variable | N | Variable in SPSS |
|---|---|---|
| Weighted opportunity value | 36 | OPPVALUE |
| Sales+contracts value | 36 | SALES |
| No. of active opportunities | 36 | NOOFOPP |
| No. of won opportunities | 36 | NOOFWON |
| No. of won/No. of active | 36 | WONTOOPNO |
| Customer-billable travel per month | 36 | CUSTTRAVEL |
| Non-customer-billable travel per month | 36 | TRAVEL |
| Total travel per month | 36 | TOTTRAVEL |
| DQP average | 155 | DQPAVEG |
| Hours | 155 | HOURS |
| Off-shore hours | 155 | OFFSHOHOURS |
| Customer-billable travel per project | 155 | CUSTRAVEL |
| Non-customer-billable travel per project | 155 | TRAVEL |
| Total travel per project | 155 | TOTTRAVEL |

The results of the calculations are shown in *Chapter 5.6*. Certain variables are left out since they did not form a statistically significant correlation with any other variable. For example, sales+contracts value (SALES) and the number of won opportunities (NOOFWON) did not correlate with any other variable. The data set of N=36 investigates the relationship between sales data and travelling while the data set of N=155 investigates the relationship between customer satisfaction and travelling in a project.

Finally, the results of the statistical analysis were discussed in a group discussion with the case company's representatives. Two procurement managers, travel category manager and a sourcing manager were present in the group discussion from the case company's behalf. The group discussion lasted approximately one and a half hours. The main themes were the findings of the statistical analysis. The main purpose of the group discussion was to analyze the underlying factors behind the results of the statistical analysis and implications of the results. Group discussion were considered empirical material and comprehensive notes were formed on the key subjects of the group discussion.

# 5. CATEGORY MANAGEMENT AND BUSINESS INTEGRATION IN THE CASE COMPANY

## 5.1 Category management as a business integrator

Interviewees from procurement were asked to define category management from their own perspective. Outside procurement, category management was not a familiar term. The interviewees from procurement provided the following definitions:

*"Category management is a dynamic approach for collaboration and a change process. Separate persons from the organization gather to discuss the objectives of the company and different parts of the organization and their link to the sourced category and how this category should be developed in relation to the objectives of the company and changes of the environment."*

*"Category management creates dialogue and collaboration with business units. Category management involves business units in the planning of category-specific sourcing strategy making use of the total volume of the company and needs between different business units and countries. The objective of planning the category strategy is to clarify similarities and conflicts between business units and to create a compromise."*

*"Category management is not procurement; procurement is an important part of it but it should be a company view; how can we evolve in the smartest way on this planet for what we are producing to our customers."*

All of the definitions emphasize collaboration between business units and procurement and therefore, integration between procurement and business units. Last definition is more conceptual than the first two but all provided definitions share the thought that the main purpose of category management is finding synergy and integration in the sourcing category between different parts of the organization.

Based on the interviewees' definitions, the following model illustrated in *Figure 13* was formed. In the middle is the sourced category and stakeholders affiliated with the category form the surrounding circle, e.g. business units and procurement. A strategy process is included since objectives of the company and their link to the category, evolution, and category strategy were considered important by interviewees. The circularity of the model depicts a continuous process and need for integration among stakeholders.

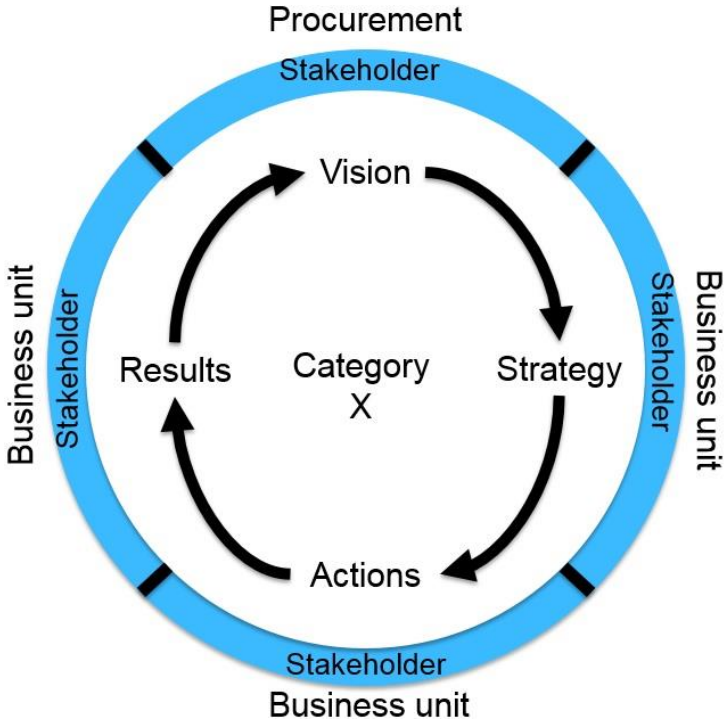


***Figure 13.*** *Category management based on interviewees' definitions*

Procurement professionals considered the objective to be the most important decision in category management. It forms the basis for the category strategy and actions derived from the strategy. Interviewees from procurement emphasized that procurement alone should not decide on the objectives but instead they should be decided in collaboration with business units. Also choices in partners, suppliers, and technologies were considered important, although, these decisions are, in fact, actions and should support the objective. Related to these decisions are make-or-buy decisions which were also considered to be part of category management. One procurement professional considered the following about decision-making in category management:

*"The objective is the key. If it has not been decided, the following decisions are based on something else than they should."*

Visibility between business units and procurement was not considered systematic. Business units did not recognize being part of a category strategy process. They did not perceive systematic information exchange regarding business unit or procurement plans and strategies. Four interviewees from business units did recognize a few situations in which they discussed about the future implications in a certain category and how the category should be developed with procurement, although, this was not considered systematic. Based on these results, integration driven by data and information sharing between business units and procurement is lacking even though it is emphasized in the definitions procurement personnel provided. One interviewee from a business unit concluded with the following:

*"The plans should be shared between them (procurement) and the business. I do not know anything about the procurement plans for 2016. How can they be of any help to me or I can be of any help to them? I cannot, it is invisible for me."*

## 5.2 Data-driven business integration and improving it

Interviews provided interesting results regarding data utilization in integrating procurement and business. Interviewees focused on the data most relevant for them and considered data to be in a support role. One interviewee from procurement referred to data as *"the gasoline for a car"*. Internal data sources were much more common and external data sources were used ad hoc if at all. Overall, the data exchange was very situational and none of the interviewees recognized any formal or determined way for changing information between procurement and business units. This was also considered a problem in some instances and interviewees recognized a need for development in this area. Data-driven integration between business and procurement builds on combining data and information from the IT systems of both the business and procurement. One interviewee concluded on data exchange between procurement and business unit as follows:

*"I do not recognize any controlled or determined data exchange between us. Instead, it is situational."*

Interview results on sharing of data between business units and procurement are shown in *Figure 14.* Spend data was considered the most relevant in procurement. One interviewee from procurement emphasized that *"most valid is the spend data which makes a frame for everything".* Business units also requested spend related information, such as spend per partner, the most from procurement instead of raw spend data. Eight out of eleven interviewees recognized spend data information being requested from procurement. Second most common data requested from procurement was information about contracts and frame agreements. Most often business units asked about pricing and what kind of agreements case company had with a certain supplier. This information was not stored in a database and it was requested with e-mails, phone calls or face-to-face. This was considered problematic and time-consuming for both the procurement and business unit personnel. The information was often needed ad hoc in urgent matters and therefore, the burdensome way for acquiring the information posed problems. Centralized and systematic way for providing basic information about contracts and suppliers was considered valuable by interviewees.

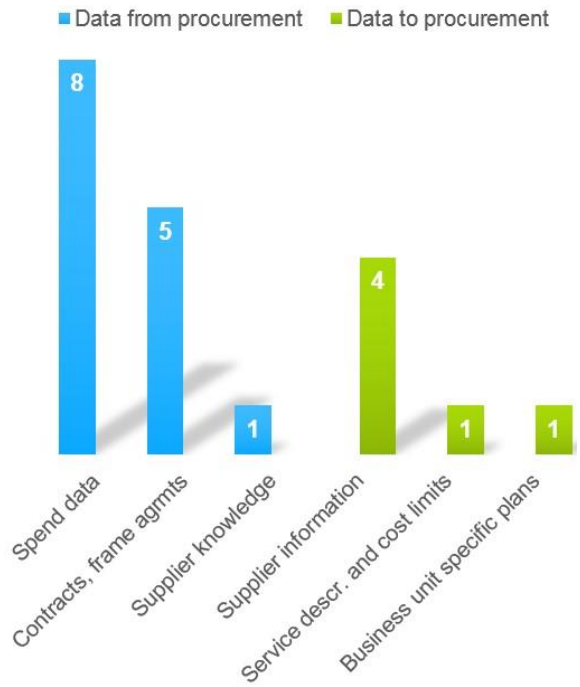


***Figure 14.*** *Interview results on sharing of data*

Business units also asked information about the suppliers from procurement, although, only one interviewee from a business unit considered this to be common and systematic. Mostly business units were conscious about the supplier base and only looked for advice from procurement when supplier base needed modifications. Procurement requested mostly supplier information from business units. Four out of eleven interviewees reported procurement requesting supplier information from business units. Requested information included the most important suppliers, how supplier base should be developed and what prospects and opportunities exist for the supplier base. There was no formal channel for sharing this information. One interviewee from a business unit reported procurement asking for service descriptions, demands, and cost limits for procured services and products from business units. This was needed for making contracts and agreements with suppliers. One interviewee from a business unit recognized procurement requesting business unit specific plans. This was needed for category development to understand what kind of goals and plans business units have for the future. The requested plans included business unit strategies, budgets, income statements, and information on investments. Strategies and budgets of business units were considered essential for category management.

Interviewees also proposed interest for developing the data between procurement and business unit. Overall, data-driven integration was considered lacking which showed up as informality and difficulties in data sharing. Five interviewees from both procurement and business units considered proactiveness and faster responsiveness as important areas for development. Nevertheless, interviewees were not able to come up with specific ways for improving proactiveness. Scanning the supplier base and estimating future spend beforehand were considered important and useful. Correlation calculations were chosen for

the second phase of this thesis to investigate possibilities for proactive spend estimation in the travelling category. One interviewee considered the following important aspect about data:

*"If you can step out from the history to the future, you can make a big difference for the future."*

Five interviewees highlighted that spend data and contractual data are separate. This caused a lot of manual work when business units needed information about the contracts. Requesting information about contracts, spend and suppliers was considered time-consuming by business units and they argued that it should be available through a centralized channel, such as a SRM (supplier relationship management) database. At the moment, the case company did not use a SRM system but one will be implemented when the ERP (enterprise resource planning) system is updated. One interviewee from a business unit emphasized formality and regularity in reporting data about spend and contractual information, such as supplier measurement. This emphasizes the need for data-driven integration. At the moment, data sharing and integration was considered irregular and ad hoc.

One interviewee from procurement considered the category strategy formation to be more of a rehearsal at the moment and considered it to be important for it to become a wider documentation in the future. This would require wider integration between procurement and business units and more systematic data sharing. The results of such integration could be, for example, one SRM system used by both procurement and business units combining data from both organizational units. Some opportunities for proactive information were found possible through integration also. One interviewee from procurement considered it important to be able to tell business units what their cost structure would look like in the future based on current spend. Therefore, the relationships between travelling, sales, and customer satisfaction were chosen as the focus of the second phase of this thesis to investigate possibilities for forecasting future spend through integrating data from IT systems of both business and procurement.

## 5.3 Role of procurement and its link to integration

Integration between procurement and business functions was considered to be affected by how procurement is perceived by other functions. Interviewees from business units and procurement emphasized value brought by procurement. If procurement did not bring value, business units would not include them into the bidding process. Therefore, procurement is perceived through their role, value they provide to business units, their involvement in decision-making, and situations in which business units bring procurement into the bidding process.

Half of the respondents, especially those who had been employed for a longer period of time, recognized the shifting role of procurement from an operative support function towards a more strategic partner. The remaining half of the respondents still considered procurement to be a traditional support function. One of the respondents from a business unit not affiliated with the success case saw procurement's role as "a servant". Category management was considered to be adapted to a further degree in the case business unit. This was supported by the fact that the respondents of this business unit were the ones who considered procurement to be a significant partner. Procurement perceived itself to be a facilitator and a consult bringing business units together and providing input and pragmatics to their decision-making. The interviewees, who saw procurement's role as shifting towards strategic, also had more integration with procurement in decision-making and data sharing.

The value added by procurement was still considered very traditionally. Operational elements of value were considered more important than strategic elements of value. Interview results are shown in *Figure 15*. Six out of seven non-procurement interviews considered the main value procurement brought to be good contract terms, prices, and negotiation skills to achieve them. Three out of seven non-procurement interviews also provided a more strategic form of value from procurement: supplier management and knowledge. Providing business units with operative value requires less early interaction compared to the strategic elements of value in which procurement has to be involved early in the bidding process. One of the interviewees concluded by saying:

*"This has been very price- and cost-focused which is an easy way to do procurement, getting the price down. Rather the value comes from building these ecosystems. If you think about our company strategically, our role will shift more and more towards a service integrator."*

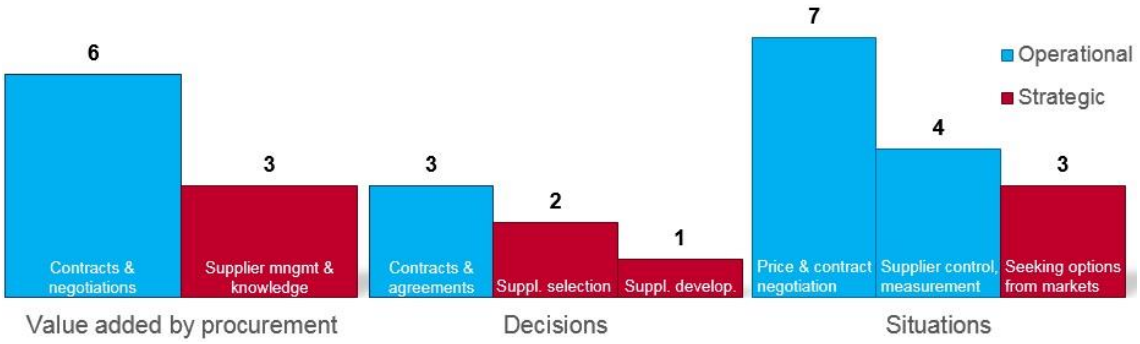


***Figure 15.*** *Interview results on procurement's role*

The decisions business units did with procurement also supported traditional view of procurement. Three out of seven non-procurement interviewees considered the decisions done with procurement to be contracts and agreements which is an operational decision. Strategic decision-making was scarce. Only two out of seven non-procurement interviewees selected suppliers and partners in collaboration with procurement and one out of seven

non-procurement interviewees made decisions about supplier base development with procurement. The situations where other functions included procurement were also very traditional and operational. All non-procurement interviewees included procurement into the process when contracts and prices were negotiated. Four out of seven non-procurement interviewees used procurement to support supplier and partner control, contractual management, and supplier measurement. Only three out of seven non-procurement interviewees used procurement to assist in seeking options from the supplier markets. Some interviewees from business units considered procurement to be rarely involved early in the bidding process to the customer. Two interviewees from business units concluded by saying:

*"Business units are directly in contact with suppliers. That is not good."*

*"They provide us with contractual and financial negotiation…that's 10 % of what they could do…They are seeing the full breadth of technologies from multiple business units so they can actually advise us in the technology selection as well."*

Overall, business units wanted procurement to be a strategic business partner who would provide input for strategic decisions such as technology and supplier selection. It was considered important for the company's future success that procurement's role would become more strategic. It was clear that for procurement to have a more strategic role in the company, early involvement and integration was required. If procurement is involved as late into the bidding process as negotiating contracts, almost no integration with business units is required. Head of a business unit considered the following important in terms of procurement as an integrator:

*"The role of procurement as a service integrator should enable and catalyze multiple partners as an ecosystem instead of using negotiation power on one partner at a time."*

The responsibility of managing supplier base was divided between business units and procurement. Procurement was often involved very late in the bidding process if negotiations with suppliers were needed. If procurement's role was to become more integrative in the case company, it should be involved earlier in the bidding processes. Early involvement would increase the integration between procurement and business units emphasizing the need for data-driven integration as well.

## 5.4 Integration in the selected success case

The selected case proposed different results compared to the general view on procurement described in the interview results above. Selected sales case was considered to be a success case, mainly because it was won. It was also considered to be a must-win case for the company. The case was a public bidding and cost of the offering was considered to

be a central element in customer's decision-making. Main reason for success was considered to be a cost-effective solution which complied with customer's demands. Five interviewees were directly related to the case. Two of them were from procurement and the remaining three were from a business unit in charge of the sales case. Four interviewees (two from procurement and two from business unit) considered the main enabler of the cost-effective solution to be a supplier selection which affected a large portion of the offering. Two interviewees from business unit also considered the usage of target costing and design-to-cost methods in the bidding process to be an important part of the cost-effective solution. One interviewee from the business unit also considered a dedicated bid team to be important for the success of the case. The enablers of the cost-effective solution and value added by procurement are demonstrated in *Figure 16*.


***Figure 16.*** *Results of the selected case*

Procurement's value in the case was considered different than overall. Procurement was involved earlier into the bidding process in the success case. Also, there was more integration between procurement and the business unit in the procurement category of the case. Three out of five interviewees considered the main value procurement brought into the case to be an introduction of a new supplier. One interviewee from the business unit considered procurement's value to be a good relationship with the business unit. This was linked to the supplier introduction which was facilitated by the good relationship between procurement and business unit. If the relationship was not so open, business unit would have been much more hesitant to take in a new supplier into the service process. Only one interviewee considered procurement's value in the case to be traditional contract negotiations. One interviewee considered procurement role in the case very important and concluded by saying:

*"They knew the supplier market and players we should approach. They were able to guide both us and the supplier in what is needed. They are a good interpreter in between."*

Interviewees did find areas of improvement in the case also. According to the business units, procurement could have been involved even earlier. There is a gap between the bidding process and the implementation of the service which shows up as deficiencies in the contracts and agreements. Bidding process is responsibility of a different business

unit than the one providing the service to the customer. If one party, for example procurement, was involved from the start of the bidding process to the implementation, this gap could be reduced. This requires early interaction and integration with procurement. Two interviewees considered the following lessons learned important:

*"Mostly business units and the bid team were actively in contact with partners. If something was to be learned, procurement could have been involved even more in that phase."*

*"Procurement could have been involved even more. Then there would be one party which is systematically involved in the whole chain from the bid to the contracting and beginning of the service. Then things would not fall between the cracks."*

## 5.5 Summary of interview results

Interviews offered a broad view on the integration between procurement and business in the case company. Integration was observed through category management, data, and procurement's role and involvement in decision-making. The success case proposed different results compared to the "status quo" in the case company which supported the importance and positive effects of category management. Overall, category management produced integration in the case company, although, data integration was still considered lacking. Procurement was viewed very traditionally and it was included quite late in the bidding process normally. Procurement's role in the case company was under a shift since category management was quite recently adopted. A more strategic role of procurement in the future would require integration with business units. This is the need that category management in procurement was aiming to fulfill. Category management integrated procurement and business in the decision-making in the focus of a category.

The success case confirmed the outcomes category management was estimated to have. The relationship between procurement and business was more integrated and procurement was more involved in strategic decision-making, such as supplier selection, in the category of the success case. Business had even recognized a need for integrating procurement earlier in the bidding process. Data-driven integration was still considered lacking in the success case due to no formal channels for sharing data and information between procurement and business units. Procurement's early involvement in the bidding process was considered to help in this matter by allowing one party to have visibility to the case from the beginning to the end. Interviewees also recognized a need for a SRM (supplier relationship management) system and proactive information provided by procurement. Information about contracts and suppliers was considered time-consuming to request from procurement. It was requested by e-mails and there was no formal channel for sharing this information. Procurement personnel had the idea of implementing a SRM system during an update to the ERP system so therefore, it was not considered relevant for this thesis.

Both business and procurement considered proactive information about future spend important. Possibilities for proactive information through data integration between procurement and business are investigated in the next chapter. This was considered the most valuable information procurement could provide by business units. It was also considered to provide a different and innovative approach into the data exchange between business units and procurement by combining data from both organizational units. In this thesis, travelling category was chosen as an example for data integration between procurement and business units. In this category, data integration was considered innovative because the focus on the benefits of travelling was completely different compared to the focus of traditional procurement. The focus was not on the costs of travelling and reducing them but instead, the value travelling provides to the case company.

## 5.6 Relationships between travelling, sales data, and customer satisfaction

Results on the correlations between sales data and travelling are shown in *Table 4*. Results offer interesting insight into the significance of travelling in sales. They also confirm that data-driven integration can provide significant input for managerial decision-making in procurement and business. This chapter will focus on the calculations and the future implications are discussed in later chapters. Weighted opportunity value (OPPVALUE, the value of all active opportunities weighted by their chance of winning) showed negative correlation (-0.344) with customer-billable travelling, significant at the $p<0.05$-level. This relationship can be a sign of scarce resources which is a limitation everywhere in a company.

***Table 4.*** *Correlation results on sales data and travelling*

| | | OPPVALUE | NOOFOPP | WONTOOPNO | CUSTTRAVEL | TRAVEL | TOTTRAVEL |
|---|---|---|---|---|---|---|---|
| OPPVALUE | Pearson Correlation | 1 | ,603** | -,212 | -,344* | -,201 | -,288 |
| | Sig. (2-tailed) | | ,000 | ,214 | ,040 | ,240 | ,089 |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |
| NOOFOPP | Pearson Correlation | ,603** | 1 | -,184 | -,684** | -,453** | -,597** |
| | Sig. (2-tailed) | ,000 | | ,282 | ,000 | ,006 | ,000 |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |
| WONTOOPNO | Pearson Correlation | -,212 | -,184 | 1 | ,530** | ,573** | ,567** |
| | Sig. (2-tailed) | ,214 | ,282 | | ,001 | ,000 | ,000 |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |
| CUSTTRAVEL | Pearson Correlation | -,344* | -,684** | ,530** | 1 | ,877** | ,974** |
| | Sig. (2-tailed) | ,040 | ,000 | ,001 | | ,000 | ,000 |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |
| TRAVEL | Pearson Correlation | -,201 | -,453** | ,573** | ,877** | 1 | ,963** |
| | Sig. (2-tailed) | ,240 | ,006 | ,000 | ,000 | | ,000 |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |
| TOTTRAVEL | Pearson Correlation | -,288 | -,597** | ,567** | ,974** | ,963** | 1 |
| | Sig. (2-tailed) | ,089 | ,000 | ,000 | ,000 | ,000 | |
| | N | 36 | 36 | 36 | 36 | 36 | 36 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Customer-billable travelling showed a relationship (0.877 at a significance level of 0.01) with travelling done to existing delivery projects. Personnel of business units may invest more time into existing projects at times of low sales opportunities which shows as the negative relationship between the value of sales opportunities and customer-billable travelling (-0.344; $p<0.05$). Similar negative relationship is present between number of active opportunities and customer-billable travelling (-0.684; $p<0.01$). Non-customer-billable travelling and total travelling also have a significant negative correlation with the number of active opportunities (-0.453; $p<0.01$ and -0.597; $p<0.01$). This may imply that more non-customer-billable travelling is done to generate new opportunities at times of low opportunities. Still, the data offered no evidence that this kind of travelling generated new opportunities when inspected with a delay of one or two months. Based on these observations, no conclusion can be made implying that travelling would increase sales.

Significant relationships of *Table 4* are illustrated in *Figure 17*. The most interesting of the found statistically significant correlations was the strong positive relationship between all forms of travelling and the ratio of won opportunities per all active opportunities. This ratio tells the relative amount of won opportunities, i.e. the average chance of winning an opportunity. It is important to notice that correlation does not tell anything about the direction of the correlation. This may imply that travelling would increase the chance of winning a sales case. Optionally, it might also mean that more travelling is done in sales cases where a higher chance of winning is perceived which could be a sign of effective travel planning. Furthermore, this indicates that personal contact has a significant effect on closing a sales deal in both cases. The first option is objective while in the second option, the importance of personal contact is a subjective decision of the sales personnel. Still, it is important to notice that it does not imply that increasing travelling would increase the chance of winning a sales case. Winning a sales case is a complicated process affected by multiple factors, one of which could be personal contact between the sales people and the buyers of the purchasing organization. Travelling is merely a medium for transporting the value of personal contact. It is possible that well-planned travelling could have positive outcomes on the success of sales, although, confirming this would require additional research.

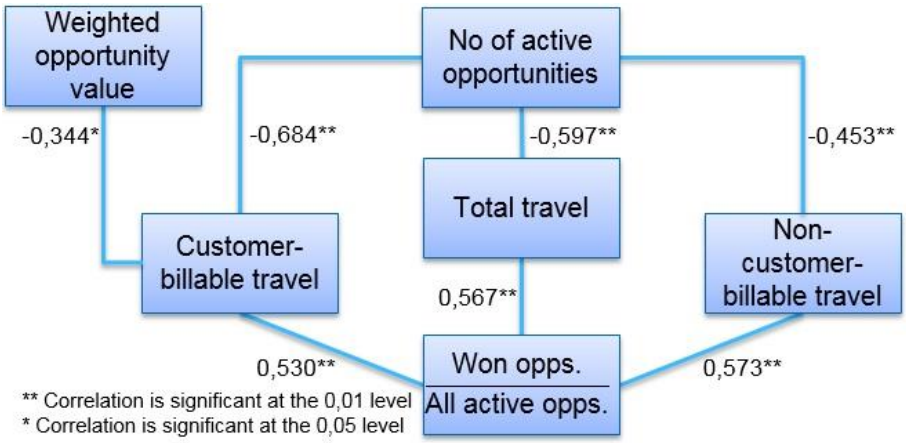


***Figure 17.*** *The relationship between sales data and travelling*

Results on the relationships between travelling and customer satisfaction in a project are shown in *Table 5*. There was no non-customer-billable travelling expense directed to projects so total travelling is nearly the same as customer-billable travelling. Therefore, both customer-billable and total travelling showed a significant relationship with the hours (0.459; $p<0.01$) and off-shore hours (0.493; $p<0.01$) signed to a project. The average of customer satisfaction survey (DQPAVEG) showed significant ($p<0.05$), negative relationship with the hours (-0.182) and off-shore hours (-0.237; $p<0.01$) of a project. The relationship between travelling and customer satisfaction survey results did not result in a significant correlation with $p<0.05$ but it was close to the $p<0.05$ –level. In other words, the results showed no implications that travelling and personal contact in a project would increase the satisfaction of a customer. Still, it is important to understand that travelling is often required to complete a delivery project. For example, meetings with customers might be needed when planning the project and its results with a customer.

***Table 5.*** *Correlation results on project satisfaction and travelling*

| | | CUSTTRAV | TRAVEL | TOTTRAVEL | DQPAVEG | HOURS | OFFSHOHOURS |
|---|---|---|---|---|---|---|---|
| CUSTTRAV | Pearson Correlation | 1 | ,044 | 1,000** | -,152 | ,459** | ,493** |
| | Sig. (2-tailed) | | ,583 | ,000 | ,059 | ,000 | ,000 |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |
| TRAVEL | Pearson Correlation | ,044 | 1 | ,046 | -,099 | ,048 | ,089 |
| | Sig. (2-tailed) | ,583 | | ,570 | ,219 | ,551 | ,271 |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |
| TOTTRAVEL | Pearson Correlation | 1,000** | ,046 | 1 | -,152 | ,459** | ,493** |
| | Sig. (2-tailed) | ,000 | ,570 | | ,058 | ,000 | ,000 |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |
| DQPAVEG | Pearson Correlation | -,152 | -,099 | -,152 | 1 | -,182* | -,237** |
| | Sig. (2-tailed) | ,059 | ,219 | ,058 | | ,024 | ,003 |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |
| HOURS | Pearson Correlation | ,459** | ,048 | ,459** | -,182* | 1 | ,807** |
| | Sig. (2-tailed) | ,000 | ,551 | ,000 | ,024 | | ,000 |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |
| OFFSHOHOURS | Pearson Correlation | ,493** | ,089 | ,493** | -,237** | ,807** | 1 |
| | Sig. (2-tailed) | ,000 | ,271 | ,000 | ,003 | ,000 | |
| | N | 155 | 155 | 155 | 155 | 155 | 155 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The significant correlations of *Table 5* are illustrated in *Figure 18*. They clearly implicate that larger projects have more travelling and hours assigned to them while simultaneously, the customers of larger projects are less satisfied. It is apparent that work hours assigned to a project do not cause dissatisfaction. After all, work is required to create and deliver the results of a project to a customer. The implication may be that larger projects are harder to control which allows more problems to arise. Problems cause increased travelling to "put out fires" while at the same time, customers are less satisfied due to the arising problems. High relationship between total project hours and off-shore hours shows that the relative amount of off-shoring used per project is quite stable. Off-shore hours also had a higher relationship with travelling than total project hours implying that travelling might depend more on off-shore hours than total hours of a project. Nevertheless, the main implication is that project size affects off-shore hours of a project, travelling, and customer satisfaction significantly.

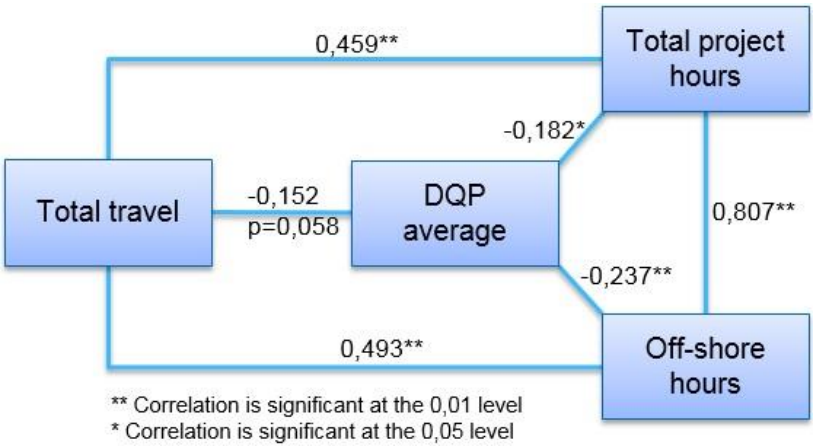


***Figure 18.*** *The relationships between customer satisfaction and travelling in a project*

Overall, hypothesis 1 can be considered supported to some extent. The correlations found imply that there is a positive relationship between the success of sales and travelling, although no direct correlation between monthly sales volume and travelling could be found. Therefore, the relationships found offer no possibilities for forecasting future travelling spend based on sales opportunities or estimated sales. Looking at the second set of data, it is clear that there is no direct correlation between customer satisfaction and travelling in a project. In other words, hypothesis 2 is not supported and there is no direct relationship between customer satisfaction and travelling. Customer satisfaction is affected by multiple factors and project size is a major factor affecting travelling, satisfaction and the hours assigned to a project. These results offer possibilities for forecasting future travelling spend of projects based on the hours assigned to them. Nevertheless, this would still require forecasting the hours required to complete a project.

# 6. DISCUSSION OF RESULTS

## 6.1 Category management in the case company

The results found in interviews and statistical analysis were considered interesting by the case company's representatives. Both results were discussed in separate group discussions with representatives of the case company. Interview results were considered to reflect current situation while the results of the statistical analysis were considered valuable as such but also valuable considering the potential of data-driven integration between procurement and business units. One manager from procurement considered that the analysis has lowered their barrier to conduct similar analyses in the future. Therefore, integrating data from a business unit and procurement can be considered to have provided successful results in this case.

Interviews offered a broad view on the category management of the case company. Representatives from both the procurement and business units considered the ongoing changes in the integration between procurement and business units to happen into the right direction because of category management. Procurement was considered to have taken a proactive role with the success case's business unit instead of a traditional, reactive role. For example, procurement proactively scouted opportunities for improving the current supplier base. Representatives from business units emphasized that procurement has to add value for them to be included in the bidding process. Long-term commitment from procurement was also valued by business units which contributed to the integration of procurement into the bidding process. The most valid starting point for integration between procurement and business units was argued to be shared goals which was also the aim of category management. Category management had also been personalized for business units by naming a category manager for a category. Then, specific category managers are assigned to certain business units involved in their category. This was perceived as a good thing by the representatives of both the business units and procurement with the risks being minor. This was found to clarify the responsibilities and roles in a certain category and to ease communication between business units and procurement.

Results on procurement's changing role in the case company were surprisingly similar with those of Tassabehji & Moorhouse's (2008) article "The changing role of procurement: Developing professional effectiveness". In both studies, procurement saw a clear shift towards a strategic business partner in charge of supplier relations and networks instead of contract negotiator with no strategic input. The change was considered to happen slowly in both cases. Management of procurement considered the main reason for this to be the fact that the beliefs and the way how business units perceived procurement could not be changed at once but instead incrementally. Management of procurement considered some business units to be easier to work with because there were positive

experiences in the past which allowed the people in those business units to be more adaptive to change their way of thinking which had happened with the business unit of the success case. Therefore, the way procurement's role is perceived by business units can be considered to have a profound effect on the adaptation of category management in the case company.

Procurement was still considered a support function to some extent and it was involved when business units considered it necessary. It is also important to notice that most of procured products and services were standard but some required more attention. Resources in procurement are also limited which emphasizes focusing on the categories providing the most potential benefits. In some categories, the focus was more towards the future and supplier ecosystems were under consideration. Overall, the first group discussion ended with three final thoughts: 1) procurement should know where business is going, 2) procurement is a facilitator and a support resource and 3) business units should share their goals more with procurement.

The definitions interviewees provided for category management shared many similarities with the definition of O'Brien (2009). All definitions emphasize interdepartmental collaboration. Synergy and integration with business units are important for successful category management. O'Brien (2009) also emphasizes process-based strategy approach as is visible in *Figure 13*. In practice, category management also shared similarities with van Weele's (2010) definition of category management with spend analysis being the starting point followed by categorization and improvements. In the case company, spend analysis was the first phase in seeking improvement opportunities in a certain category. Based on the interviewees' responses and *Figure 13* the following practical definition for category management can be proposed:

*"Category management is a collaboration strategy process between procurement and business units. It involves both the business units and procurement in category-related strategic decision-making in a company. A category strategy is formed based on the objectives of the company and relevant business units to develop the category in relation to the objectives and changes in the company's business environment. Category strategy guides actions to develop the category based on spend analysis and the needs of different business units."*

The proposed practical definition emphasizes the category strategy as a key component of category management. Category management and category strategy should support a company attempting to achieve its vision by emphasizing cross-functional teams leading the category into the right direction through the category strategy. It also combines a multitude of elements from the former definitions of O'Brien (2009) and van Weele (2010), such as interdepartmental collaboration and process-based strategy approach. This practical definition is formed based on a category management adapted in the ICT industry. Procurement in the ICT industry is very sales project dependent and therefore, it requires

close collaboration between procurement and business units even in business-related decision-making. Similar, close collaboration might not be relevant in other industries. Sourced services and products can cover a large portion of the product offered to the end customer implying that procurement could have a significant effect on the outcomes of sales deals. For example, in the success case, a supplier selection provided by procurement was considered to have a significant positive effect on winning the sales case.

## 6.2 Statistical analysis as a data-driven business integrator in category management

Both the interviews and statistical analysis offered interesting results on the data-driven integration between procurement and business units. The differences in the results between the "status quo" and the success case also suggest that category management has developed integration between procurement and business into a right direction. Sharing goals and strategies was considered an important starting point for integration between procurement and business units in the interviews and in the group discussions. Overall, data-driven integration between procurement and business units was considered lacking in the case company but some categories, such as the category of the success case, looked promising. Procurement managers considered the statistical analysis to indicate benefits of such integration and the results to be valuable.

The results of the statistical analysis were also presented in a group discussion and possible applications, benefits and challenges for similar data-driven integration were discussed with the representatives from the case company's procurement. Representatives considered this kind of an analysis to be eye-opening. Understanding the link between a procured entity and its added value was considered an important aspect of the analysis. Procurement managers emphasized understanding the added value of sourced products and services to business units so procurement can support business units in the best possible way. Presenting relevant, proactive information on the value suppliers provide to business units could allow procurement to influence and support decision-making in business units better. In this manner, procurement's perspective changes from a cost-focused view towards a value-focused view. For example, procurement might focus more on developing travelling to become more traveler-friendly and goal-oriented to maximize the value it provides.

Similar analysis integrating data from procurement and business units could be conducted with other business units of the case company. In this thesis, only the data considering one business unit was used. Similar analysis could also be conducted at another level of focus, for example, per sales person. However, the availability of data might produce challenges for more focused analyses. Interesting applications were also found in other indirect categories outside travelling, such as, facility management. Companies pay significant amounts for renting offices and other facilities provided by external suppliers.

This kind of analysis could provide information on how these facility investments affect employee satisfaction, employee turnover, project progression and even customer satisfaction. Other similar categories include training and employee's personal ICT (information and communications technologies) and their effect on performance.

Opportunities for similar integrative analyses are harder to recognize in direct categories. One example includes the ratio of outsourcing vs. own services in projects and its effect on customer satisfaction. Overall, this kind of analysis on the benefits and costs of supplied goods and services were considered interesting and potentially important for decision-making in business units. One of the main challenges for similar cross-functional, data-driven integration was found to be the responsibility for initiating and conducting them. It is hard to initiate cross-functional, integrative data analyses if one is not aware of the available data. Coming up with possibilities for such analyses requires a broad view on the available data. Responsibilities for conducting such analyses are not clear either. According to the company representatives, the person that finds the problem will have the responsibility to solve it most of the time.

## 6.3 Improving data-driven business integration

The results of this thesis build on data as an integration mechanism between procurement and business units in procurement category management. Currently, case company is using data-driven integration mechanisms situationally. The main integration mechanisms used between procurement and business units are cross-unit teams for category strategy formation and centralization of decision-making to these cross-unit teams regarding a certain category. The responsibility for cross-functional data sharing or integration was not assigned to anyone. Most of the time, the person, who had the need for such integration, had the responsibility for finding out what information is available in the company. IT system-based integration could be a step towards solving this problem. It can be proposed that there is still a need for IT system-based integration in the case company. This was emphasized by the fact that business unit personnel considered it time-consuming to request supplier-related information from procurement when this information could be stored in a common database, such as, a supplier relationship management (SRM) system. There was no formal platform for sharing information between procurement and business units which hindered information sharing between them. Therefore, of the integration mechanisms presented by Trautmann et al. (2009), formalization is clearly needed more in terms of IT systems.

Current integration mechanisms could also be improved. Even the head of a business unit considered it important to involve procurement earlier in the decision-making in the bidding process. Decision-making in a bidding process is not linked to the category strategy formation but it is related to the sales cases of the case company. This is common in a project business environment in which the offered solutions are almost always tailored to the customer. In a project environment, procurement should be involved in the sales cases.

Category strategy formation involves the business units that produce the services to the customers while bidding process involves the business units that sell the services to the customers. In other words, procurement could work as an integrator between production and sales.

The goal of the statistical analysis was to test whether IT system-based integration could offer useful information for managerial decision-making in the case company. At the moment, data and information of different organizational units are separated in the case company. Personnel in one organization unit are not aware of the information or data in other organization units. For example, procurement was not completely aware of the available data in the sales information tool. This hinders analyses integrating data from different parts of the case company. There are also no clear responsibilities for cross-organizational analyses or information sharing. Integration in IT systems could improve this by creating formal channels for sharing information and data which could benefit other organizational units. As the statistical analysis suggests, integrating data from different organizational units can be useful.

# 7. CONCLUSIONS

## 7.1 Summary of the main findings

This thesis studied the relationship between category management and data-driven business integration in procurement. The aim was to increase synergy and collaboration in the case company and to find ways for increasing integration between business units and procurement through data-driven integration mechanisms. The remaining of this chapter summarizes the main findings of this thesis.

1. *What is category management in the context of the case company?*

This thesis attempted to form a practical definition for category management. The definition presented in the discussion of results in *Chapter 6.1* shares many similarities with the definitions offered by literature, such as, O'Brien (2009) and van Weele (2010). Data-driven integration also becomes more important with category management changing procurement's role from a support function towards a strategic partner. Category management requires integration between procurement and business units. This was found important in the former research literature and the interviews. At the moment, procurement's position had progressed in the company and the relationship and integration with business units had improved, especially in the success case. Main factor for this development was found to be category management. Procurement was considered a valuable asset in the success case, even critical for winning it by some. Procurement's role was more strategic with the business unit of the success case when compared with the "status quo" in the case company.

There is not much research on category management and this thesis has proposed a definition combining elements from existing definitions and category management of the case company. This thesis has found category management to be more than just defining different categories. The definition of category management has been specified in the context of the case company. Category management is of great significance for companies in project-based business, such as ICT industry, although it has not been present in the research literature.

2. *What kind of data integration exists currently between procurement and business? How category management affects the integration between procurement and business unit in the success case?*

Category management had been adopted to a higher degree with some business units, especially the one of the success case. Still, even in the success case, data-driven integration was considered lacking. Integration between procurement and business could improve the efficiency of bidding to the customer greatly by allowing one party to be present in the process from the beginning of the bidding to the implementation of the

service. There were no formal mechanisms for sharing data between business units and procurement. Instead, it was done by informal e-mails which was considered time-consuming and sometimes annoying. Effective category management can improve integration between business units and procurement which had happened in the success case. Without integration, the synergy and collaboration between procurement and business units could become very shallow. This emphasizes the need for integration in category management. It has not been a common theme in past research literature. In addition, current IT systems did not offer the necessary integration, for example, in the form of an SRM system. Data from both business and procurement was not integrated in the form of analyses in the case company in the past. This thesis has opened up possibilities for such integration by providing interesting insight in the form of an integrative analysis.

3. *How can data-driven integration between procurement and business units be improved?*

Integrating data from procurement and business units can provide relevant information for managerial decision-making as the statistical analysis suggests. As mentioned in the research literature, the data used in procurement has mainly been short-term spend, supplier measurement and purchasing performance data. There is no research on integrating data from business units and procurement. There is not much research on the value of procured products and services even if value is a common theme in the marketing literature. Modern procurement should expand its view from spend analyses into the value that the supplier base provides to the company, which can serve business units as well.

Improving data-driven integration requires clear responsibilities for managing the data sharing in a company. First of all, there should be a formal channel for data sharing and integration. IT systems should provide the necessary support for such integration, for example, by providing the necessary cross-functionality. In the case company, the responsibility for conducting cross-functional analyses was not clear and often, the responsibility was on the organization or on the person with the need for such analyses. After the formal channel for information and data sharing has been established, utilizing it should be promoted, for example, in the form of integrative analyses.

## 7.2 Managerial implications

Major managerial implication of this thesis is the increased importance of procurement in modern business. It is clear that procurement needs to be involved in strategic decision-making. Procurement was considered an important factor in the success case and even the business unit had recognized its central role in winning the case. This emphasizes the need to involve procurement early in project-based business in which outsourcing plays a major part in the offering. Category management is an effective tool to involve procurement but it also requires commitment from the business units. It is up to the business unit's personnel to involve procurement. For this to happen, procurement has to provide value, for example, in the form of relevant analyses or supplier-base knowledge. As a

suggestion, in a project-based environment, procurement should be involved early also in the sales cases to get the best out of the supplier base in a single project.

Second important managerial implication of this thesis is the lack of data-driven integration between business units and procurement. In this thesis, two mechanisms of data-driven integration were found important: integration of IT systems and analyses integrating data from multiple functions. Even in a modern ICT company, requesting data from another function was considered time-consuming. There were no common supplier information system platforms, such as an SRM system. As a suggestion, an SRM system should be implemented to ease this data sharing. Clear responsibilities for improving data sharing between business units and procurement should be set. At the moment, lack of data-driven integration hindered performance in the company in many ways. First, data from both procurement and business units was not integrated for continuous or ad hoc analyses in the case company. This thesis was considered eye-opening in this matter. Second, the bidding process consisted of multiple phases and there was no single party involved from the beginning of the bidding process to the beginning of the service. This was the reason why problems often occurred in the beginning of the service. Therefore, procurement should be involved earlier in the bidding process. Data-driven integration could also solve this problem as it would increase the visibility each party has on the whole bidding process.

This thesis also offered minor managerial implications, for example, in the travelling category. The results of the statistical analysis emphasize the need for travelling and the value it provides. In the world of virtual meetings and highly developed telecommunications, personal contact and business travel still has value. Statistically significant positive correlation between the average chance of winning a case and travel costs implies that goal-oriented business travelling should not be limited. This could have negative impacts on the sales of the company in the long run. As a suggestion, the costs of travelling should not be blindly cut. Instead, goal-oriented travelling should be promoted. Nevertheless, it is important to notice that making travelling more effective, for example, in terms of cost-effectiveness will still be beneficial. After all, it is a cost which can possibly be lowered to provide the same value. Second minor implication was the size of a project affecting many variables, such as off-shored work hours, travelling costs and customer satisfaction. Larger projects are often harder to control which allows problems to arise. Therefore, putting out fires is needed and it is highly probable that this involves travelling to the customer. Travelling itself was not found to have any form of relationship with customer satisfaction.

## 7.3 Limitations and criticism

The limitations of this thesis relate to its methodology and results. Interviews and Pearson's correlation coefficient involve different limitations. Main issues for interviews are reliability, forms of bias, validity and generalizability. Generalizability and reliability are

common limitations for single case study research in general (Ellram 1996). Contextual generalizations can be made. For example, in project-based ICT companies, category management can benefit cross-functional collaboration because sourced products and services form a large share of the offering to customers. Reliability refers to the repeatability of the study (Saunders et al. 2009, p. 326). The aim of this study was to study a specific phenomenon in a specific environment at a specific time. Therefore, the study cannot be repeated and the interview results are not meant to be generalized to every company. Still, other companies in a similar situation, such as project-based ICT companies utilizing category management, can benefit from the results of the interviews and this thesis. Validity refers to the availability of interviewees' knowledge in the interviews (Saunders et al. 2009, p. 327). In this study, the interviewees were chosen using purposive sampling to confirm that the necessary information was available in the interviews. Different forms of bias are related to the issue of trust in the interviews. In this case, interviews results were presented to the representatives of the case company who considered them to be valid to represent the current situation.

Pearson's correlation coefficient does not have similar methodological limitations as interviews. Its limitations are related to the validity of data used and managerial relevance of results. Reliability of correlation analysis can be counted mathematically. Data for the analysis was simple to collect. It was numerical data which does not include personal valuations (unlike the replies in the interviews) except for the customer satisfaction survey results. Data was also inspected in the case company to validate it and to remove errors. Therefore, the data used can be considered objective and valid to some extent. Validity is questionable because the data was not gathered to the purposes of this thesis. Instead, it was historical data already present in the company. Therefore, its focus was not the same as the focus of this thesis and its accuracy can be questioned. Applicability of the results is also limited. There is always a chance that the relationships found are random, even with low p-values. However, p-value is a widely accepted measure to contest the possibility of random occurrence of a relationship.

Pearson's correlation coefficient does not take into account the direction of the relationship or causation (Saunders et al. 2009, p. 459-460). For example, a statement that travelling affects the chance of winning a case cannot be made. Both directions have to be taken into account which was done in the group discussions with the case company's representatives. It is also possible that a third, external variable which has a relationship with the studied variables causes the relationships found (Saunders et al. 2009, p. 459-460). For example, winning a sales case is a complicated process in which the end result is affected by many factors. It is possible that travelling and winning the case do not have a direct relationship but, instead, a third variable causes the relationship between these two variables. The repeatability of the statistical analysis is good. The same analysis can be applied to different business units and companies and the results will be comparable.

## 7.4 Implications for further research

The main finding of this thesis was the increased importance of data-driven integration between business units and procurement in category management. This is an unknown area in current research even though it has significant potential in practice. In this research area, this thesis has only "scratched the surface" by arguing that there is a clear need for increased data-driven integration in the case company and possibly modern companies in general. IT systems have developed greatly but their potential is not used to its fullest. This thesis has focused on two forms of data-driven integration that were considered lacking: IT system integration and integrating data from multiple organizational units into analyses. At the moment, literature does not offer any taxonomies for different forms of data-driven integration in the context of procurement. Also, there is no research on how to achieve data-driven integration in a company.

The same problem is present in the integration literature in general (Pagell 2004). This thesis has been highly exploratory on the subject and more inductive and deductive research is needed. The research on category management and data-driven business integration is not mature, which requires inductive research. Deductive research can be conducted to confirm and contest the results of this thesis and possibly following research. For example, there is no widely accepted definition for category management. Further research could also study the possibilities of data-driven business integration in procurement to a wider degree since the focus of this thesis is quite limited.

This thesis has contributed on other research areas than data-driven integration as well. This thesis offers a practical model for defining category management. The proposed model does not conflict with the current definitions of category management but it does emphasize different aspects of the phenomenon. The proposed category management framework emphasizes the strategy process behind category management while the most elaborated definitions at the moment emphasize category formation. In this thesis, category formation is considered mainly a beginning for category management. This shares similarities with the views of van Weele (2010) on category management. Interview results also confirm the views of Tassabehji & Moorhouse (2008) on how procurement's role changes in practice. Results of the statistical analysis also offer support for the significance of personal contact in business relationships, although, more research is needed to confirm these results. The hypothesis of personal contact and customer satisfaction having a relationship is interesting even though the statistical analysis did not confirm the existence of this relationship. Nevertheless, more qualitative research methods could offer interesting insight into this subject.

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# APPENDIX 1: SYNERGIES AND INTEGRATION MECHANISMS

***Table 6.*** *Synergies and integration mechanisms (adapted from Trautmann et al. 2009).*

| Motive | Centralization | Formalization | Information systems | Lateral mechanisms |
|---|---|---|---|---|
| **Economies of scale** | Strategic purchasing centralized at category manager (specification setting, market analysis, sourcing strategy, contract placement)<br>Operational purchasing at each site (ordering, expediting) | Standardized purchasing process with clear definition of roles and responsibilities | IT system to leverage information on local needs, prices, contract structures and suppliers across all sites | Category manager and local managers work in teams to develop global strategies for a category.<br>Local knowledge and requirements are considered in global strategy development and acceptance across sites is ensured |
| **Economies of information and learning** | Category manager must approve RFQ list and sourcing decision | Purchasing processes differ across sites, but comparable outputs for each major activity defined<br>Decision gates for important activities (supplier selection, category strategy) defined a priori by category manager | IT system to leverage information on best price, suppliers and contracts across sites<br>Knowledge database with detailed information, templates, etc. about project, best practices | Category manager to transfer category and market knowledge by being involved in the purchasing transaction and working together with the respective local sites |
| **Economies of process** | Full purchasing authority is decentralized to sites | Manuals, guidelines and instructions with best-practice purchasing process and related tools | Global database with manuals and instructions | - |

# APPENDIX 2: INTERVIEW FOR ANALYSTS

**Interview - analysts**
Interviewee:
Interview time:

**1. Link to procurement**

- **Tasks and responsibilities**

**1.1 How and how often are you in contact with procurement?**
**1.2 Are there any decisions you make in collaboration with procurement/business?**
**1.2.1 Can you describe a typical decision-making situation with procurement/business?**

**2. Data**

**2.1 What kind of data is relevant in your work (compare to the portfolio model)? What data is relevant between you and procurement? The answers define the data referred to in the latter questions.**

**2.2 What data does procurement ask of you for their needs?**

**2.2.1 Can you reply to these requests?**
**2.2.2 Why/why not?**

**2.3 What kind of data sources do you use to fulfill procurement's needs?**

- **internal/external**
- **ERP, excel, tacit knowledge, spend data**
- **suppliers, competitors, clients, markets**

**2.4 How easily is the data available, what complicates the use of data (e.g. data inconsistency between different sources)?**

**2.5 What new opportunities do you see for data usage in procurement?**

**2.5.1 What would offer best potential in the data used by procurement?**
**2.5.2 How could the data better support proactive decision-making in procurement/business?**

**2.6 In what form or how should the data be offered for it to be more useful? visualization etc.**

- **audience, forums for discussion**

- **combining different data sources**

**3. Case**

**3.1 How were you involved in the case?**
**3.2 What allowed the case to succeed?**

**3.2.1 What differentiated the case from other cases and competitors?**

**3.3 What allowed the success of the case from your point of view?**

**3.4 What kind of data was used and how?**

**3.4.1 What was the role of data, support/success factor?**

**3.5 Would it be possible to improve data usage in the case? How?**

**Any comments, questions, free word?**

# APPENDIX 3: INTERVIEW FOR PROCUREMENT

**Interview – procurement**
Interviewee:
Interview time:

**1. Link to procurement**

- **tasks and responsibilities, relationship to procurement**

**1. Category management**

**1.1 How would you define category management?**

- **More of a process or an approach?**

**1.2 What is your role in category management?**
**1.3 What decisions do you consider most important in category management/your own management?**

**2. Data**

**2.1 What kind of data is most relevant in your work (compare to the portfolio)? What data travels between you and procurement? This defines the data referred to in the latter questions.**

**2.2 How does the data you use at the moment support the needs of procurement?**

**2.2a What kind of data or information does procurement ask of you? What about business?**

**2.2.1 Can you reply to these requests?**
**2.2.2 Why/why not?**

**2.3 What kind of data do you use in your own management?**

- **qualitative/quantitative?**
- **different data sources, external/internal**
- **ERP, excel, tacit knowledge, spend data**
- **suppliers, competitors, customers, markets**
- **examples**

**2.4 How easily is the data available? What makes it difficult to use? (for example inconsistency between sources)?**

**2.5 What kind of opportunities do you see for improving the usage of data in category management/procurement?**

**2.5.1 What opportunity would offer the best potential?**
**2.5.2 How could the data support proactive decision-making more?**

**2.6 How should the data (in what form) be offered for it to be more useful?**

- **visualization, etc.**
- **approaches, forums for discussion**
- **combining between systems**

**3. Case**
**3.1 How were you involved in the case?**

**3.2 What allowed the case to succeed?**

**3.2.1 What made the case different from other cases/competitors?**

**3.3 How did procurement help the case to succeed?**

**3.4 What kind of data was used and how?**

**3.4.1 What role did the data have in the case, support/success factor?**

**3.5 Could data have been utilized better? How?**

**Anything to add, comments, free word?**

# APPENDIX 4: INTERVIEW FOR BUSINESS

**Interview – business**
Interviewee:
Interview time:

**1. Link to procurement**

- **tasks and responsibilities, relationship to procurement**

**1.1 How and how often are you in contact with procurement?**
**1.2 How do you see the value procurement provides to business?**
**1.3 Are there any decisions you make in collaboration with procurement?**
    **1.2.1 Can you describe a typical decision-making situation with procurement?**
**2. Data**

**2.1 What kind of data is most relevant in your work (compare to the portfolio)? What data travels between you and procurement? This defines the data referred to in the latter questions.**

**2.2 What kind of data or information does procurement ask of you?**

    **2.2.1 Can you reply to these requests?**
    **2.2.2 Why/why not?**

**2.3 What kind of data do you use in your own management?**

- **qualitative/quantitative?**
- **different data sources, external/internal**
- **ERP, excel, tacit knowledge, spend data**
- **suppliers, competitors, customers, markets**
- **examples**

**2.4 How easily is the data available? What makes it difficult to use? (for example inconsistency between sources)?**

**2.5 What kind of opportunities do you see for improving the usage of data in managerial decision-making?**

    **2.5.1 What opportunity would offer the best potential?**
    **2.5.2 How could the data support proactive decision-making more?**

**2.6 How should the data (in what form) be offered for it to be more useful?**

- **visualization, etc.**

- **approaches, forums for discussion**
- **combining between systems**

**3. Case**

**3.1 How were you involved in the case?**

**3.2 What allowed the case to succeed?**

**3.2.1 What made the case different from other cases/competitors?**

**3.3 How did procurement help the case to succeed? What about business?**

**3.4 What kind of data was used and how?**

**3.4.1 What role did the data have in the case, support/success factor?**

**3.5 Could data have been utilized better? How?**

**Anything to add, comments, free word?**

# APPENDIX 5: LINKS BETWEEN INTERVIEW QUESTIONS AND RESULTS